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ABSTRACT

Of the 64 libraries responding to a 1978 Association of Research Libraries (ARL) survey, 37 indicated that they used automated circulation systems; half of these were commercial systems, and most were batch-process or combination batch process and online. Nearly all libraries without automated systems cited lack of funding as the reason for not automating. This collection of documents comprises: (1) a detailed survey response analysis; (2) four planning documents including a systems analysis and design study from Colorado State University and a project definition from University of Wisconsin/Madison; (3) two descriptions of conversion activities from Iowa State University and University of North Carolina; (4) two reports from Rutgers University on the effects of automated acquisitions on library operations and staffing (one concerning staffing requirements); (5) four descriptions of uses of systems management information for library use studies and collection development purposes, one from Virginia Polytechnic Institute and State University, one from University of Connecticut, and two from Washington University; and (6) three policy statements on confidentiality and access to circulation records, from University of Michigan, Iowa State University, and Rutgers University respectively. This collection is introduced by a concise summary which discusses conversion and training; effects on organization and staffing, library operations and use, and management information; and general systems evaluations. (THC)

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Automated Circulation

Kit 43

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AUTOMATED CIRCULATION SYSTEMS IN ARL LIBRARIES

All ARL libraries with automated circulation systems which responded to a recent (February 1978) SPEC survey expressed either partial or full satisfaction with their systems, and their answers indicate that the effects of automated circulation are for the most part those anticipated by the libraries during planning.

Of 67 survey replies, 37 libraries use automated systems; half of these are commercial, and most are batch process or combination on-line and batch process. Nearly all libraries without circulation systems cite lack of funding as the reason for not automating. Another four libraries do not circulate materials.

Initial decisions to automate are most often based upon needs to handle routine tasks more efficiently and to release staff to handle direct public services, and attempts to reduce costs per item processed. For the most part, circulation systems are able to effect these changes in responding libraries. Reduced costs are attributed mainly to the ability to handle increased workloads by existing staff rather than to any reduction of staff size.

Conversion and Training. The earliest reported installation date is 1957, and 22 libraries have converted to automation since 1970. The length of time and amount of effort required for conversion depends upon the level of operation prior to installation of the system, and can take anywhere from three months to three years, with an average time of 17 months. If the current system replaces an older automated or semi-automated system, then conversion is reported as requiring less time and disruption of library operation. During conversion, training time ranged from one hour to one month per person. One reported strength of a commercial system is provision of training. In campus-developed systems, initial training often is done by trial and error; after the first group of staff is trained, it is common for libraries to produce manuals. Samples of such manuals, although not included in the Kit, are available on loan from SPEC.

Effects on Organization and Staffing, Library Operations and Use, and Management Information. In check-off lists of choices, the majority of libraries report that although they did not reduce staff as a result of automated circulation, it did enable more flexibility regarding use of staff. Many survey respondents note that work units were reorganized after automation, often resulting in more attention to public services because library staffs were freed from many routinized tasks. Many respondents note that current staff are able to cope well with increased circulation activity because of automation. In the category of library operations and use, effects are reported most often in the areas of faster user access to needed materials, more accurate and useful records of transactions, and more accurate and useful records of location. Although libraries interpret "management information" in a number of ways, the most reported use of a system in this area is for listings of new, lost, or overdue items. One interesting use of management information is for collection utilization studies and collection development.

General Evaluation. All libraries reported partial or full satisfaction with automated systems, which are seen as improvements over manual systems regardless of type. Satisfaction with automated circulation system performance falls into four areas, based on answers to the question, "In what capacities or functions has it lived up to your expectation." User satisfaction and improved patron service, including faster check-in and check-out and/or more time for public service functions, is mentioned most often. Improved record-keeping, statistics gathering, and management information is the next most cited satisfaction. The third most common response deals with the library's ability to handle increased circulation loads with no increase in staff. The fourth satisfaction is with the hardware and software performance, and with programming refinements that allow libraries to automate specialized functions, such as reserve, holds, and overdues.

Limitations in software/programming and in circulation activities the automated system actually is able to perform well are mentioned overwhelmingly when libraries were asked, "In what capacities or functions has it not lived up to your expectations?" Whereas commercial systems can deal with routine functions, in-house programming is often necessary to refine the system or add new applications. Many respondents with batch processing systems indicate a need for on-line systems. Other dissatisfactions concern lack of cost reduction and hardware obsolescence.

More complete information and analysis of survey reponses are included in the SPEC Kit.

SPEC Kit Documentation. From the variety of documentation received with survey responses, 16 documents (100 pages) are included in the Kit:

- Detailed SPEC survey response analysis,
- Four planning documents, including a systems analysis and design study and a project definition,
- Two descriptions of conversion activities,
- Two reports on the effects of automated acquisitions on library operations and staffing -- one concerning the use of microfiche daily circulation records and one concerning staffing requirements,
- Four descriptions of uses of management information available from systems and its utilization for library use studies and collection development, and
- Three policy statements on confidentiality and access to circulation records.

The SPEC Office files contain well over 50 other documents on implementation and use of automated circulation systems, in addition to the Kit documents, and ARL members and SPEC subscribers are able to access these files by phone, letter, or in person.

ASSOCIATION OF RESEARCH LIBRARIES

OFFICE OF UNIVERSITY LIBRARY MANAGEMENT STUDIES

SPEC Kit Evaluation Form

The materials enclosed in this Kit are examples of current management practices in academic and research libraries. These items were collected via a survey of the member libraries of the Association of Research Libraries and are selected for inclusion in this Kit because they illustrate a current technique or are judged by OMS staff as being among the best of the materials received.

The documents reproduced in this Kit are working tools developed by individual libraries to meet their specific purposes. The SPEC Kits are not intended to provide models or prototype systems that can simply be copied by other libraries. Instead the intent with these illustrations is to stimulate further innovation and improvement in the management practices of academic and research libraries.

Your evaluation of this Kit is solicited.

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2. Did you find this SPEC Flyer and Kit useful?

   a. not at all

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   c. quite a bit

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(OVER)

4. What changes in format or content would improve the usefulness of this service to your library?

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6. Name: ____

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More documentation on automated circulation systems is available in the SPEC files, and may be accessed by phone, letter, or in person by ARL members and SPEC subscribers.

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ASSOCIATION OF RESEARCH LIBRARIES

OFFICE OF UNIVERSITY LIBRARY MANAGEMENT STUDIES

INITIAL SURVEY RESULTS

CIRCULATION SYSTEM

SPEC APRIL 1978

GENERAL INFORMATION

1) Does the library have an automated circulation system? 37 yes 30 no

If "no", please briefly indicate the library's reasons for not automating the circulation process, and the library's future plans regarding an automated circulation system.

Lack of funding is cited as main reason for not automating

If "yes", please respond to the following:

TYPE OF SYSTEM
21 Commercial (Name)
2 In-house library computer
16 Campus-wide computer
8 On-line or 14 Batch-process
10 Combination of On-line and Batch-process
Other (please describe)

When was the system installed? *1967 earliest year*
22 systems since 1970

PERSON TO CONTACT regarding circulation system

Name —

Title —

Work Address —

Phone Number —

2) Please attach any existing documentation that describes the library's automated circulation system.

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PLANNING FOR AN AUTOMATED CIRCULATION SYSTEM

1) Please attach existing documentation such as planning or committee reports, comparison of systems, requests for proposals, justification for system, or other reports or data collections that were used or generated during the decision-making to automate circulation.

2) Rank the reasons for the library's decision to automate from most to least important.

LISTED AS		
1st *2nd or 3rd*	*30*	More efficient handling of routine tasks such as charging and discharging materials, sending out overdue notices, etc.
2nd or 3rd	*27*	Release of staff time to handle public service contacts
3rd or 4th	*24*	Reduction of costs per item processed
2nd or 4th	*22*	Creation of statistical information for management purposes
		Other (specify) *replace old equipment; better patron service; collection utilization; accuracy, remote access to catalog; more workload with same staff; support of other departments; e.g. personnel and technical services.*

CONVERSION AND IMPLEMENTATION

1) Please attach documentation on installation, conversion and initial implementation of the system.

2) What total amount of time (in months) was spent on conversion and installation? *3 months - 3 years; 17 months average*

3) How many staff members were involved in conversion activities?

0-1, average of 2.2 professional staff

1-50, average of 6.9 support staff

4) What time did training program require per person? *1 hour - 1 month*

5) Please attach documentation on formal training activities.

EFFECTS OF AUTOMATED CIRCULATION SYSTEM ON ORGANIZATION/STAFFING

1) Please attach documentation (studies, progress reports, committee reports, staff newsletters, job descriptions, organization charts, etc.) regarding the impact of the automated circulation system on the library's organizational structure and staffing.

2) Please indicate if implementation of the system has:

		YES	NO
11.5 to 10 *15 to 13* *6 to 5*	Reduced total number of FTE from to	*6*	*23*
4 to 1 *3 to 1, 2 to 1*	Reduced number of professionals from to	*5*	*24*
1:2 to 1:7 *2:9 to 1:9* *1:11.5 to 1:10*	Changed ratio of professional to non-professional staff *0:12 to 1:12* *2:4 to 1:4* from to *1:15 to 1:13* *1:8 to 1:6*	*11*	*19*
6 to 7 *11.5 to 10*	Reduced number of support staff *30 to 17* from to *8 to 6* *15 to 13*	*7*	*24*
	Resulted in reorganization of work units and/or changes in reporting relationships	*21*	*10*
	Resulted in transfer of staff members to other functions	*18*	*13*

Other: *3 responses -- Because of automation, has not been necessary to increase circulation staff, even though circulation has increased.*

EFFECTS OF THE AUTOMATED CIRCULATION SYSTEM ON LIBRARY OPERATIONS AND USE

1) Please attach existing documentation (annual report, progress report, etc.) regarding the effects of the automated circulation system upon library operations and library use.

2) What specific effects has the library experienced since installation of the automated circulation system?

	YES	NO
Faster user access to needed materials?	*28*	*6*
Fewer user complaints?	*23*	*6*
More accurate and useful records of transactions?	*31*	*1*
More accurate and useful records of location of items and circulation patterns?	*28*	*3*
Increased success in collecting fines and/or retrieving missing materials from delinquent borrowers?	*24*	*8*
Faster processing of reserve requests?	*22*	*9*
Faster reshelving time?	*23*	*8*

Other:

EFFECTS OF AUTOMATED CIRCULATION SYSTEM ON MANAGEMENT INFORMATION

1) What information available from the automated circulation system has been used for management information purposes, e.g.

18 User characteristics - circulation patterns
18 Identification of high demand items for duplication
28 Listings of new, lost, overdue items;
17 Reports of terminal activities;
18 Use statistics by form, subject or age of material;
7 Types of interlibrary loan transactions;
12 Reserve activities;
____ Other (specify)____________________

2) Please attach documentation (e.g. samples of prepared reports, descriptive materials) concerning the uses the library administration makes of the management information listed above. Such uses might include modifications to acquisition or circulation policies, changes in service procedures, creation of planning documents, annual or quarterly reports, help in budget planning, collection assessment, allocation of book money, analyses of use patterns and services, policies for loan periods, availability, duplication of titles, weeding, changing location of books, etc.

3) Please attach documentation on the library's policies relating to access to records created by the system, and the privacy of such records. (e.g. who has access to such records, how long are the records kept, how are they secured, etc.)

EVALUATION OF AUTOMATED CIRCULATION SYSTEM

1) Please attach documentation on evaluation

2) (Referring back to question 2 of Planning for an Automated System). Is the circulation system accomplishing what the library had expected?

16 yes   1 no   14 partially

3) In what capacities or functions has it lived up to your expectations?

SEE FOLLOWING PAGES

4) In what capacities or functions has it not lived up to your expectations?

SEE FOLLOWING PAGES

In what capacities or functions has the automated circulation system lived up to your expectations?

USER SATISFACTION--IMPROVED SERVICES

- o Reduction in patron complaints.
- o Greater user satisfaction.
- o Checking out and discharging in much faster
- o Attention can be given more to needs of users.
- o Rapid check-in.
- o Charging and discharging materials faster.
- o Provides better patron service, increased circulation.
- o System is convenient to patrons.
- o Check-in, check-out better.
- o Improved user services.
- o Able to staff an information desk.

HANDLE MORE WITH SAME STAFF--BETTER USE OF PERSONNEL

- o Allowed us to keep pace with a significantly increasing circulation.
- o Routine tasks are handled much more efficiently.
- o More effective use of personnel.
- o More efficient handling of routine tasks. Attention can be given to non-routine problems.
- o Has enabled library to handle increasing circulation volume more efficiently and to reduce time spent on each function.
- o Increased circulation without increased staff.
- o Ability to handle high volume quickly and efficiently.
- o Improved programs without increasing staff

RECORDKEEPING--STATISTICS--MANAGEMENT INFORMATION

- o Ease of gathering statistics; on-line access to charge and patron records.
- o Management information provided.
- o Records more accurate; more valuable statistical information.
- o Better control of collections; management data.
- o Increased accuracy of record-keeping.
- o Better control of circulation activities.
- o Fairly accurate records for materials charged out. Good statistical information.

HARDWARE--SOFTWARE--SPECIAL FUNCTIONS

- Limitations on fine capabilities and bibliographic file maintenance are being reduced through additional programming.
- Reliability of equipment; reserve division functions including production of a catalog and use statistics.
- Hardware and software performance have exceeded expectation.
- Improved reserve reading list processing.
- Some new capabilities.
- Trapping books with holds, printing overdues.
- Treatment of serials an unexpected boon.

In what capacities or functions has it not lived up to your expectations?

HARDWARE-SOFTWARE

- Equipment obsolescence.
- Programs for producing management data on user patterns and statistics on use of material by class, form, or user type have never been completed
- Inability to produce list of patron's book charges; inability to handle hourly Reserve Room fines.
- In some of our Reserve, hold and identification of delinquent borrowers functions. (Could be remedied with on-line system.)
- Certain types of materials are still circulated on a manual system. Hold and recall operations are still slow and cumbersome.
- Vagaries and deformed IBM cards result in not matching discharge and charge--result in erroneous overdues.
- Software package performs only the minimal function of charge, discharge.
- On-line system would be more desirable.
- Machine malfunctions cause a loss of approximately 5% of data.
- Lack of interest by vendor after the sale.
- Reserve capabilities. Doesn't handle system-wide functions.
- They do not have the acquisitions module up and running yet.
- Lack of freedom to modify system programs. Ongoing maintenance and system changes provided by vendor much more expensive than anticipated.
- Accuracy of data. Reliability in general. Response time.
- Increasing "down time" due to heavier and harder use of terminals than they could be expected to withstand.
- Many problems yet to be solved--missing books, fine control, etc.
- Batch process delays access to current records from 1-3 days.
- Since one-half collection is still without book cards, it is necessary to continue a parallel manual system; thus check-out procedures are more complicated.

- Pre-punched badges not issued to all patrons; creates problems for library.
- Lack of on-line system slows the potential ability for immediate information on materials in circulation, identifying bad borrowers. Many functions still have to be performed manually.
- Renewals, recalls, billing procedures are inadequate. Statistical information also inadequate.
- Hardware obsolete. Needs improved programming. Need for shelf-list or acquisitions data base.

COSTS

- Has not reduced costs as hoped.

Brown University Memorandum Date March 27, 1978

To Maurice Glicksman, Dean of Faculty and Academic Affairs
Richard Ramsden, Vice President of Administration and Finance

From Charles D. Churchwell, University Librarian

BROWN
MARCH 1978

RE: AUTOMATED LIBRARY CIRCULATION AT BROWN

INTRODUCTION:

The Circulation Services Department of the Brown Library System is one of the largest departments. It differs greatly from the other units primarily in that its staff, except for the Head Circulation Librarian, are all non-professionals. The primary responsibility of the department is the efficient circulation of all library materials. The sections include: Rockefeller Circulation, Sciences Circulation/Reserves, Rockefeller Reserves, Shelving and Door Guards.

The supervisor, six Library Technical Assistant IIs, and 24 students (10 hours each per week) in Rockefeller Circulation are primarily involved in the charging out and discharging (checking in) of the Rock's books and bound journals. The quantity of staff is necessitated by the 101 hours of service per week, the high labor intensity of the file maintenance operation of the manual circulation files, and the miscellaneous auxilliary functions such as needle sorting overdue cards, sending overdue notices, billing for fines, charging and discharging books at carrels, assigning carrels and lockers, recalling books, notifying patrons of recalled books, paging materials from special locations, etc. The Sciences unit with its supervisor, 3 LTA IIs, and 22 students, performs these same functions at about 1/4 the load as the Rock and handles the Sciences Course Reserves operation (approximately 2,000 items per semester). The Rockefeller Reserves unit's supervisor, 4 LTA IIs and 24 students handle the processing and circulation of the Rock's reserves collection (approximately 6,000 items per semester). The Shelving Unit's supervisor, 4 Clerk Is, 1 Library Technical Assistant I, and 5 students handle all reshelving and stack maintenance. There are approximately 6 FTE Door Guards for the Rock and Sciences combined.

Of the responsibilities of the Circulation Department's units, the routine charging-discharging, recall, overdue notification, billing and records keeping functions lend themselves readily to automation. The more than 100,000 records in the manual circulation files are accessed thousands of times each day by student workers and full-time staff. The conversion of these files to machine readable form and the provision of access through terminals would generate a dramatic reduction in the required staffing at both the Rockefeller and Sciences Circulation desks. The production of overdue notices, bills, etc., would all become automatic processes. Management information, currently unavailable, concerning questions such as what materials are circulating and how often, would be easily derived. Faster and more accurate processing of books would be realized through the elimination of hand-written information. Above all, user satisfaction would be enhanced through increased processing speed.

The history of automated circulation systems has seen an evolution in philosophy. Until the 1970s, most automated circulation systems were batch systems. Information concerning charges, discharges, holds, etc., was collected during a working day and sent to a computer for processing at night. Overdue notices, bills, etc., were produced as well as hard copy listings of the master circulation files. These systems went a long way to eliminating the labor intensity of the circulation function, but their major drawback was their 24 hour turnaround. It was impossible to know, during the course of a day, what transactions had occurred that day. Nevertheless, these systems were, and still are very cost effective.

In the last 8 or 9 years, online (real-time) systems have been developed. In an online system, each transaction immediately updates the master files so that they constantly reflect an accurate picture of the circulation information. Terminals can readily be used to inspect the database and inquire for up-to-the-minute book or patron status. Online systems are more sophisticated, require more computing power dedicated to the Library and provide enhanced capability to manage the ciruclating collection.

A feature of automated circulation systems that has not been implemented in many places, but one that we at Brown feel would generate increased savings is the notion of patron "self-charge". This involves the provision of suitable terminal stations programmed to allow patrons to charge out materials without the aid of library staff. The shift of patron load away from the circulation desk would leave us with a need for staff to "cover" the desk to handle transactions such as fine payments and inquiries, to page special materials, to send out notices and to run the computer.

BROWN'S AUTOMATED CIRCULATION HISTORY:

Brown has been pursuing a suitable automated circulation system for some time. The first vendor that we dealt with seriously was IBM. Their approach to our needs was to modify the IBM 3600 system, equipment designed for the banking industry. During the course of a frustrating one and one half years we attempted to make the idea work and finally abandoned it.

We then approached a small local firm called Hal Systems, Inc. (HSI). They put together a proposal that fit our needs very well using state-of-the-art hardware and techniques. The system would have been a distributed processing satellite of the 360/370 in the Computer Center, and would have made optimum use of existing computer and human resources.

At the same time, we solicited a proposal from a library computing vendor called CLSI. They provide a package system with few custom designed features. We worked with them to obtain a commitment to our "self-charge" requirement, and they developed a system and a bid.

Examination of the two proposals showed that while there was a cost differential between the systems (40% on initial equipment purchase), it was explained by the differences in provided support services (maintenance, training, trouble-shooting, system upgrades, etc.). The HSI proposal would have necessitated a high level of commitment to the Library effort from both the Computer Center and ADP. It required computer resources from the Computer Center whose availability was questionable. The ongoing software maintenance and enhancement would have been handled by a programmer whose skills were at a level not currently available at ADP. The hardware, likewise was of a complexity greater than existing Brown personnel are trained for. HSI, a two person company, was considered not substantial enough to depend upon for this necessary maintenance. While some of this expertise was available in the Library, it was also considered unwise to depend upon a single person.

CLSI's package had the advantage that their maintenance figure included all on-going costs (except for supplies and data entry) as well as software improvements. They had sold over 100 systems, most to public libraries (Providence Public among them), but some to large academic institutions like Brown (Penn, American University, NYU, some of the California libraries, Houston, University of Illinois at Chicago Circle, Johns Hopkins, URI). Their record for service and trouble-shooting via a toll-free "trouble line" was good. Their system can be brought into a library that has no computer resources (hardware or human) and made operational in minimum time.

Their current system is being redesigned so that eventually the installed circulation systems can be upgraded to automated catalogs. While this effort is not currently in Brown's plans, we will benefit from the redesign as it will provide enhanced features. Access to the master files will be available by more than just call number, author and title, and there will be more flexibility in reports and notices. CLSI is also doing extensive hardware design to produce terminals and equipment to optimally meet library users needs.

As the above thinking would imply, the decision was made to push for a CLSI system for Brown. The dramatic staff savings indicated that borrowing money to purchase the system and repaying the investment over time was a viable approach. The following pages present a detailed year by year budget for the CLSI system and show how the cost can be recovered. The time frame shown is "worst case". It is highly likely that after a few years with the new system, further staff reductions can be realized by combining the new, smaller circulation staff with the door guard and/or course reserve functions (as is already the case at Sciences). These factors and others are indicated in the "Notes" section following the budget.

Automated circulation makes sense at Brown. The resources committed to the effort at its beginning will not only be repaid over time but increased user sarisfaction will enhance the Library environment. Better management information will enable wiser acquisitions expenditures, and better user access to materials will decrease mutilation and theft. The CLSI system has proven itself in many installations and undoubtedly will find another success here.

WASHINGTON UNIVERSITY
AUGUST 1973

To: William H. Kurth, University Librarian

From: David S. Zubatsky, Assistant University Librarian

Re: Automated Circulation System

An automated circulation system was initiated in November, 1965. The programs were written in AUTOCODER, which is a low level language, and therefore, maintenance of these programs as well as the expansion of them to meet additional objectives and goals became an almost immediate problem. Mrs. Otha Overholt (now employed by the Computing Facilities Department) was hired in 1966 as Olin Library's first Systems Development Librarian. Her major circulation system responsibilities until her resignation in 1969 were the maintenance and the revision of the original programs to meet further Circulation Department requirements and to meet the specifications required by more modern data processing equipment in the Computer Center. However, it was noted during this period of time that the computer programs were in need of drastic revision in order to cope with the growing maintenance failures and delays, and the system's inadequacies in providing the needed statistical information, expansion capabilities, and user oriented services. By rewriting the programs in a high level language such as COBOL, the above needs could be met through greater simplicity, flexibility, and processing efficiency. Although, at the time, a redesigned system was agreed upon as a most desirous goal, the WUL budget was not able to absorb the necessary added hardware and software costs.

After Otha Overholt's departure in 1969, the Data Processing Division of the Computing Facilities Department, in essence, took over the maintenance, programming, and development responsibilities for both the Acquisitions and Circulation automated systems. (For two short periods of time, Wendell Yeats and Jack Test were hired as Systems Development Librarians.)

During 1971 and 1972, several needed procedural changes in book loan periods and notices, among others that could be mentioned, showed once again how antiquated the system was, and that we were reaching a most critical stage in the operation of this system.

Mr. Kurth agreed in 1972 that sufficient amounts of money should be alloted in the 1972/73 and 1973/74 budgets to allow for a redesigned circulation system. Bob Adams was assigned the task to investigate, with the assistance of the Data Processing staff, which type of system would fit our objectives.

Between the Summer of 1972 and the Fall of 1972, several alternatives were discussed, including the designing of an improved off-line batch system and an on-line circulation system. After further discussions, the WUL administration felt that present and future Circulation Department objectives would be best met by an on-line computer system, whose software and hardware costs would not be a burdensome drain on thd WUL budget.

After investigating several commercial package on-line systems, both the WUL and Data Processing staffs felt it was more economically feasible to produce a locally designed, on-line circulation system. The technical design of the system was to be based upon the senior analyst's (Otha Overholt) Master thesis completed for the Applied Mathematics and

Computer Science Department within the Washington University's School of Engineering. The Data Processing Staff began immediately to write a proposal. The goal was to design a patron-oriented system at an economically feasible level. This would be met by an in-house Burroughs 1714 mini-computer. The projected cost of the proposed system was to be much less than presently existing on-line systems on large-scale computers. Meetings with Bob Adams, Laura Kuelthau, Hardy Fuchs, Bill Smith, and Otha Overholt produced a proposal which had as its major features two always current files on the computer which would be interrogated immediately during library hours. These two files were to be the circulated books and a delinquent borrower list. These functions would be supported by a machine system whose major components were:

1. Colorado Instruments card-badge readers plus strip printers.
2. Beehive cathode ray tube-typewriter terminals.
3. A Burroughs 1714 computer.

Outstanding features of the proposed system included the following:

1. Transaction terminals which would be quiet, reliable, accurate, and easy to use.
2. Patron self-checkout capability.
3. Patron wait time would be reduced.
4. Reserve control, which would allow all charges to be done on the computer, and therefore, statistical data could be gathered to allow monitoring of the reserve collection by volume, class, or department. The present card catalogs of the Reserve Division could be replaced by computer generated book catalogs in call number, main entry, or class

5. Call number CRT inquiry and up-date from CRT terminals capabilities.
6. Delinquent borrower check
7. Notification would be made at the time of discharge of any book that has had a hold placed on it; thus eliminating the tedious reading of book trucks prior to shelving.
8. Eliminate card transportation and storage
9. No bulky printouts
10. Exist control slips produced at charging time would have a computer calculated date due. This would eliminate mistakes created by the present manual method of stamping date due.

However, due to technological problems with the computing facilities hardware, certain features of the old off-line system would have to be retained or slightly modified:

1. Name and address updating would be performed on a batch system.
2. Statistical information would be available on a request basis.
3. Archival information would be retained as presently.
4. Transaction triggered notices would be printed daily and date triggered notices would be printed semi-weekly.

Preliminary hardware costs were figured as being $4, 517 for one-time costs, $3, 871 for monthly costs (first three years) and $3, 487 for monthly costs (after three years).

Five thousand dollars were to be set aside for the remainder of FY 72/73 for preliminary costs and an additional $25, 000 was to be budgeted in the computer budget (40) for development, production, and initial hardware costs. The system was to be "plugged in" during May 1974. The old off-line system was to continue as a back-up until the new system was satisfactorily "debugged."

The WUL administration approved this proposal in February 1973 and, on March 27, 1973, Bob Adams and David Zubatsky met with Chris Cross and Bill Smith of the Computer Facilities staff to discuss leases and contracts for the circulation system equipment. Several contractual problems had to be ironed out before purchase orders could be issued. Bob wrote up the minutes from this conference and they are available in the Administrative Office files.

Since the Burroughs mini-computer needed certain atmospheric conditions, Bob Adams in April 1973 contacted the Construction, Maintenance and Safety Department for estimates on air-conditioning and remodeling of either the Bibliographer's Office or the old East Asian office. The Bibliographer's office (May 1, 1973) was selected as the first choice, and the air-conditioning environment system costs were estimated as $6, 734 by the Carrier Co.

During April, a final critical review session was to be held between the WUL staff and the Computing Facilities staff, but was cancelled due to Mr. Kurth's illness. Several attempts to reschedule this meeting failed and then toward the end of April 1973, Bob Adams began to hear rumors that the Data Processing Administrative staff was meeting frequently to reevaluate their original financial estimates on the on-line circulation system. These uncertainties were removed from the realm of speculation when on May 16, 1973, Mr. Kurth received a memo from Dr. Strauss attached to a memorandum from Hardy Fuchs which outlined the fact that certain basic changes in the program would "manifest themselves in increased costs and greater schedule uncertainty which are of sufficient magnitude to prompt a critical review of our (i.e. Computing Facilities) plans to implement an on-line circulation system." Hardware cost estimates arising from these changes would rise from the original estimate of about $3900 per month to a range of $4700-5100 per month (an increase of 21%-30%; the higher figures depending on the increase of memory capacity required.) In addition, no development costs could be estimated until September of 1973. The memo also once again outlined the various costs of alternatives and advantages/disadvantages between an improved batch system and an on-line system.

After this memo, meetings were held in the Administrative Office to discuss these alternatives in comparison to the Library's budgetary situation and its goals and objectives. In addition, Dr. Powell Niland, Professor of Management and member of the WUL Council, was also brought in for his advice and expertise. He felt that because of the University's financial commitment to the new Computing Facilites computer, as well as the present and future costs of the system, some of which he felt might be overpriced or not revealed in sufficient detail, it might not be the most opportune time to undertake the implementing of an on-line circulation system. Dr. Niland did suggest that he would meet with Dr. Strauss to discuss the matter further. After this meeting, Dr. Niland informed Mr. Kurth that both he and Dr. Strauss came tothe conclusion that at the present time, the on-line circulation system might be considered by the University administration as a blue-sky system or "plaything" in comparison with the other Library and University needs. In addition, both gentlemen concluded that the designing of an improved batch system should be presented as part of a two step approach. The second step would be the on-line system, for this would be most desirable on a long-range basis.

Soon after Dr. Niland's meeting with Strauss, Mr. Kurth held a meeting with the Library staff concerned for a final critical review. It was agreed that "for reasons of operational cost and schedule uncertainty (and the difficulty in estimating the true dimensions of the development cost)", WUL would proceed with an improved batch system utilizing Colorado Instruments Data Collection off-line and the 360/65 for night time batch processing. The staff agreed that the two-step approach should also be a goal. The system should be implemented by May 1974.

On June 1, 1973, Mr. Kurth and Dr. Strauss met with Dr. Dauten to bring him up-to-date and to inform him of WUL's decision to adopt an improved batch off-line system rather than the on-line approach. Mr. Kurth followed up this meeting with a June 7, 1973 memo to Dr. Strauss summarizing the decisions made. In addition, Mr. Kurth stated that Dr. Strauss mentioned intheir meeting with Carl Dauten that there has been a considerable momentum going to develop an on-line system and that external funding ought to be sought for "step 2" (an on-line system). Mr. Kurth committed WUL to develop, in conjunction with the Computing Facilities, a proposal for outside funding within the next six months. He noted that "the work accomplished is innovative and suggests that the package is one that is replicable in other university libraries, which would tend to attract grant money." Mr. Kurth was in touch prior to this memo with the Council on Library Resources by phone and would send them a statement of the system.

On June 12, 1973, Hardy Fuchs replied to this memo by stating the Data Processing staff was moving forward at once with the design phase of the batch system. An estimated completion date for the detail design would be September 15, 1973. At that time the staff would be able to predict the implementation target date, but the original target date of May 1974 would probably be met.

Finally, it might be useful to summarize how the new batch system will be an improvement over the old system.

First, more control over input is achieved through a simplified terminal keyboard. More operations are being internalized in the collection device, and fewer decisions are required of the circulation assistants, and therefore, there will be fewer operator errors. For example, the badge readers will determine loan periods automatically from a code in the badge. Furthermore, a date time generator will eliminate the need of placing date cards in the proper sequence of a day's transactions.

Secondly, fewer errors will result from the better designed hardware provided by Mohawk Data System. There will be fewer mechanical problems from the optical badge readers as opposed to the

IBM 357 mechanical readers. The keypunch malfunctions will be eliminated by direct message transmission from terminal to tape. Fewer errors will mean less books lost due to garbled transmissions, as well as less time spent in correcting these errors.

Thirdly, the computer programs were in need of drastic revision. By redesigning the programs greater simplicity, flexibility, and processing efficiency can be achieved. New system design techniques such as SCORE programs, and a systems control file can be utilized. Maintenance of the new programs will be much easier because they will be written in COBOL high level language instead of AUTOCODER, which is low level language.

COLORADO STATE
APRIL 1970

A
Systems Analysis
and
Systems Design
Study For An Automated Loan Desk

by

Robert W. Burns

Colorado State University

April , 1970

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I. INTRODUCTION

A. The purpose of automation is to relieve the CSU Libraries staff of as many of the repetitive, non-creative, manual tasks as possible by transferring these functions to machine control utilizing the standard pro... techniques of data processing.

B. The advantages of automation for the loan desk are as follows:

1. Eliminates two great sources of error by minimizing the manual filing and pulling of cards from the file.
2. Speeds up both the charging and discharging of books by eliminating the following steps:
    - a. Writing of call number and title information on a McBee card.
    - b. Filing and file maintenance in charge and discharge cycles.
    - c. Needling for overdues.
    - d. Answering questions concerning when books are due to return to the library.
3. Minimizes borrower participation thereby speeding up the process and eliminating a cause of error in the transcribing of information (author, title, call number, etc.) to the McBee card.
4. Easily adjusts to an expanded service load.
5. Facilitates the collection of statistical and management type information.
6. The Library can provide as many circulation lists (daily -- reports) for as many different locations (up to five carbons) as it is able to pay for.
7. Fewer people are required to perform the circulation (charge/discharge) function. Therefore, more people can be used to handle reserve books, holds, snags, shelf-reading etc. answer patron requests,
8. Makes possible additional services to the library user not possible with a manual system.
9. Creates ______ library records which are compatible with those generated and used by other ADP systems within the University as well as with ADP systems being used or proposed for neighboring institutions.

C. The Disadvantages of automation for the loan desk are as follows:

INTRODUCTION continued:

1. In an off-line batch mode system such as the one proposed here, it will be impossible (using magnetic tape and difficult but not impossible using cards) to identify books charged out during a given 12 hour period, until the print-out is received on the following morning. This problem will be compounded during weekends, holidays and evenings when the computer is shut down. In such cases, the best we can hope for is a 24 hour turnaround time and more likely a 36 hour delivery of the "daily status report." This could mean that Saturday's circulation might conceivably remain unknown until Tuesday morning or afternoon.
2. Printing characters on the high-speed printer (6400) are limited and because of wavy lines give a poor appearance.
3. The transition period during which the change from manual to automated systems takes place can be a difficult time and will require tolerance, patience and a sense of humor on the part of all concerned.

D. Goals of this study. The study described in the following pages was undertaken in order to make a detailed analysis of the circulation desk and its operation with a view toward the automation of this Department. The immediate goal is to determine at what point EDP will become economically feasible and to design an automated system within these specified budgetary constraints. This study is, therefore, fundamentally a systems analysis onto which a systems design effort has been overlaid.

I.

E. Characteristics of Library Processing and File Maintenance.

Successful use of the computer for data processing and file management in libraries is dependent upon the analyst's awareness of certain characteristics intrinsic to library data base management. These characteristics, while not unique, pose for the analyst a new set of problems not usually encountered by the analyst's use of a computer solely as a mathematical/research tool. Library processing is more closely related to administrative data processing than it is to the solving of equations, statistical analysis, or model simulation, which are the traditional stock in trade of the systems analyst. These characteristics which set library data processing apart are as follows:

1. Libraries require an extended character set utilizing not only numbers and letters, but graphic symbols as well.
2. Library files are large and need,to operate most efficiently, random access.
3. Library data bases are composed of and need to manipulate strings of characters, not just the characters.
4. Library users and hence library processing is intolerant of down-time.
5. Library users and hence library processing requires fast access time not because of the users' need for speed as much as because very large files of data must be massaged.
6. Libraries have large I/O requirements again because of the very large files of information used.
7. Library data (especially circulation desk) is very volatile and charging from minute to minute with few or sometimes no back-up records.

II. METHODOLOGY OF THIS STUDY

A. Description of A Methodology For A Systems Study. A true systems study should be able to delineate for the administrative officer(s) for whom the study is being prepared the goals of the administrative unit being studied, the resources (staff, space, funds and time) available to the unit, as well as suggest alternative methods for achieving these goal(s). All this must be accomplished in such a fashion that the administrator is permitted to select the proper alternative(s) by manipulating his resources to reach his preselected goals. Fundamentally, this is a process of balancing goals with resources on the basis of the facts gathered by the analyst in the course of his study. The facts needed by the administrator are such things as unit costs, unit times, costs of materials and equipment, availability of equipment, staffing patterns, etc., etc. It is the job of the analyst/designer to ferrit out these facts and present them to the administrator in an understandable way such that he can properly balance all variables in his decision making. The administrator can then begin the assigning of priorities and the implementation of his program.

The classical pattern of systems work begins with the systems survey whereby all systems and their relationships to each other are studied, followed by the systems analyses efforts in which the system being studied is dissected in detail, and concluded by the system design efforts in which all the parts are pulled back together again into a new or modified procedure. When sufficient time, money, and devotion are available each of these steps can undergo a number of iterations. Indeed, the entire process should be viewed as recursive in nature with as many iterations as there is time and money to support them. It is best not to allow too much overlap between these three segments of the systems study. The ideal would be to run each segment in tandem but because of the constraints of money and time this ideal is seldom achieved. However, it is wise to keep overlap to a minimum so that the direction and force of the systems efforts do not become cloudy.

The major emphasis in this study is on the measurement of economic efficiency and its corollary cost determination with user satisfaction reinforcing what the economic realities of the situation already dictate.

In the interest of expediting this study attention has been focused on those activities directly related to the charging and discharging of books from the loan desk. No attempt was made to study shelving activities, the reserve desk, fining or searching procedures, except in so far as these activities touch upon the charging and discharging activities. The immediate goal is to isolate and analyze those procedures germane to the problem of costing the charging and discharging functions. In addition, there are certain costs which will be present whether charge/discharge (C/D) routines are automated or not. These have not been considered in the cost analysis phase of this study and are as follows: administrative costs (the salary of the circulation librarian or of her supervisory staff), overhead costs (power, water, gas, depreciation on the building, etc.), selected supply costs for items not directly related to the C/D functions or for items which are used in many different operations on the desk. For example, the cost of pencils used exclusively in C/D - a problematical figure at this point as opposed to the cost of the McBee cards which are used exclusively in the C/D activities.

. Nor does this study attempt to quantify the intangible benefits accruing from better service to its users resulting from better records and the resultant public good will minus any public ill-will which change engenders for the system.

The general strategy adopted here in moving the library into automation is one of evolution, i.e. a gradual phasing in of EDP with an increasing number of transactions being handled by automation and a decreasing number by the manual techniques. This means that for an indefinite period of time it will be necessary to maintain two sets of records the automated and the manual. Hopefully, the number of manual records can be reduced to an absolute minimum as soon as possible. These remarks however, should not be taken to imply that it will ever be possible to run a completely automated system using the present records. There are now circulating library materials which are not amenable to automation. These are as follows: U.S. Government Documents, all items which have no call numbers on their cover such as single issues of journals, tapes, records, microforms, and items too small to contain a tab card. nor will it be possible in the batch-mode system described herein to handle circulation periods of less than 24 hours because of the turnaround time required on the reports received from the UCC. This means that 2 hour, overnight, and possibly 3 day materials should not be handled through the automated system at this time.

It is possible, however, to make certain compromises in order to machine sort the Dewey numbers. This can be accomplished by prefacing them with an XX and sorting them as LC numbers. Whether this or a similar technique can be superimposed upon the U.S. Superintendent of Documents number in order to make them sort in their proper sequence is a problem still under consideration by R/D.

B. Abbreviations, Symbols, Formulas, and Constants Used In This Study.

Abbreviations:

A	A symbol used to designate the factors which affect productivity (unproductive time + supervision + administration + instruction).
ADP	Administrative Data Processing
C	The operation(s) performed by loan desk staff whereby a book is checked out. Called charging.
D	The operation(s) performed by loan desk staff whereby all records for a book checked out of the library are cleared from the file and the book is checked in. Called discharging.
EDP	Electronic Data Processing
K	One thousand
N_T	Normal Time "is the time it will take a qualified person working at a normal pace and using a standardized method to perform a job." (Dougherty, p. 110).
O_T	Observed time
RF	Rating Factor
S_T	Standard time $= N_T \cdot \frac{100}{100-A}$
σ	Standard Deviation
Σ	Sum
$\bar{x}$	Arithmetic mean of the sample
UCC	University Computer Center.
SSN	Social Security Number
LD	Loan Desk
DAR	Daily Activity Report

Formulas Used By This Study:

1) $S_T = N_T \cdot \frac{100}{100 - A}$ with A = unproductive time

2) $N_T = O_T \cdot RF$ with RF = rating factor = 1.10 faster
1.00 normal
.83 slower

3) $\sigma = \frac{1}{N}\sqrt{N\Sigma X^2 - (\Sigma X)^2}$ for large samples

$\sigma = \sqrt{\frac{N\Sigma X^2 - (\Sigma X)^2}{N-1}}$ for small samples

4) $Sp = 2\sqrt{\frac{P(1-P)}{N}}$ * or for S = .05 % $N = \frac{1600\ (1-p)}{P}$

S = desired accuracy

P = preliminary percentage

N = number of times

5) to calculate hundreths of a minute = $\frac{5}{3}$. seconds

6) to calculate seconds = $\frac{3}{5}$. hundreths of a minute

7) $N_T = O_T \cdot RF$

8) $S_T = N_T \cdot \frac{100}{100 - A}$

---

* Barnes, R. p.1.

Constants Used In Study

e = 1.4771 Standardizing factor (Voor p. 94)

Used for clericals based on

Unproductive time	16.3 %
Supervision	6.5 %
Administration	3.8 %
Instruction	5.7 %
P =	32.3 %

Computed from formula

$$e = \frac{100}{100 - P} \quad \text{with } P = 32.3\,\%$$

e = 1.28 Used for clericals with no supervision or administrative responsibilities.

$$\begin{array}{r} 16.3\ \% \\ 5.7\ \% \\ \hline 22.0 \end{array}$$

$$e = \frac{100}{100 - P} \quad \text{with } P = 22.00\,\%$$

241.2 ft/minute walking speed of the average worker (Maier).

III. J. Vital Statistics about the LD and Its Operation

1. Discussion

The following statistics were judged to be those which best describe the operation of the Department as well as those most likely to be needed by the systems programmers in the preparation of the requisite software. For ease of use this information has been divided under the following headings: Statistical Summary, File Size and Traffic, and Miscellaneous. These summary operational statistics have been supplemented by information taken from an earlier LTP (2) report whose contents were judged to be appropriate to this study.

In addition to this section another portion of this report is devoted to the statistical information needed by management and its accumulation. That part of the report is devoted to the information which it will be possible to acquire when the automated system becomes operational. One of the major advantages accrued from automation is the ability to monitor an operation with a much greater degree of accuracy. The author envisions, therefore, a much deeper statistical analysis than is currently possible as one of the benefits to be obtained from this project. These new statistics are explained in detail under sections V. D. 2 of this report.

2. File Size and Traffic

a. The circulation file holds an average of 18,000 records (lines) each day. System should be prepared to reach 27,000 within the next five years.

b. In a typical work day 1500 charges will be added to the circulation file. Of this number 35% will be for an extended (Qtr.) loan. System should be prepared to reach 2300 daily charges (mean) within the next five years.

c. In a typical work day 1000 discharges will be taken from the circulation file.

3. Miscellaneous

a. Academic Libraries average 44 overdues per 1,000 circulations, requiring 29 notices with 1.5 books per notice (2, p.9).

III. J. (Cont'd.)

b. There are normally 10 reserves (holds) per 1,000 circulation in academic libraries (2, p.9).

c. Time required by a patron to fill our a McBee charge card: Mean student time to complete a single charge card: 1.72 min. Mean faculty time to fill our a single charge card: 1.4. minutes.

V. Generalized Performance Requirements for Automated Circulation Routines at CSU

A. Goals of the Automated Circulation Control System at CSU

1. To facilitate the charging and discharging of library materials.
2. To minimize borrower participation in the check-out process.
3. To maximize use of the collection.
4. To simplify and routinize as many circulation procedures as possible.
5. To maintain an attendance record for all hourly help.
6. To compile statistical information for management reports in order to facilitate control of staffing patterns, work loads and user services.
7. To build an automated system which includes sufficient internal control and self-programming features to assure that the introduction of human error is minimized.

B. System Performance and Design Requirements

1. System designed should be open-ended, flexible, modular, and upward compatible in order to phase easily into on-line and/or 4th generation equipment with a minimum of software modifications.
2. System must be capable of update/correction from the keyboard and/or tab cards.
3. System must be capable of continuous feedback (batch mode) and all records must have an audit trail.
4. All automated records must be renewable and cancellable (file update) from the Loan Desk, either by means of the keyboard and tape or by means of tab cards.
5. System must be capable of showing whereeach item not in its accustomed place is kept within 24 hours for all days on which classes are held. This will also apply to work days between sessions. It does not apply on days the library and/or computer center is closed (legal holidays).

V.B.5. (Cont'd.)

When the daily number of transactions (total in plus out) drops below 100, no print-out (DAR) will be sent to the Loan Desk. However, in no case should a print-out be over 72 hours old.

6. System must reduce the aggregate number of steps involved in circulation transactions by reducing the need for signatures and their verification, reducing the manual sorting, filing, and preparation of McBee cards.
7. System must result in easily prepared and used Loan Desk records. For example, overdues, fines, holds, charges, statistical information, etc.
8. Each user, circulating item, and transaction (charge or discharge) must contain a unique identification number. For the user it will be the Social Security number. For the circulating item it will be the call number. For the transaction it will be the transaction number (q.v.).
9. All characters will be in upper case including the work marks on the call number.
10. System will use source documents which enable the keypunch operator to prepare cards for books which return without a book card, fines, overdues, recalls, holds, etc. for insertion into the record.
11. A technique for checking out a book without a patron I.D. card.
12. A device for cancelling all or part of the fine record of a student.
13. A device for renewing a book held on a normal loan or as a quarter loan, or as a permanent loan for each of the following conditions: Loan Desk has book and I.D. card, Loan Desk does not have the book or I.D. card, Loan Desk has book but no I.D. card.
14. A device for placing hold/recall on a book checked out, thereby reserving it for another patron or Reserve. Holds automatically mean a book cannot be renewed.
15. Circulation system must be capable of integration into other automated library modules. For example, acquisition, bookkeeping, etc.

V.B. (Cont'd.)

16. Each physical piece to be circulated must contain in machine readable form its call number (all upper case and unique to the piece) and 29 characters of the title. Each person wanting to check out a book must have a unique 9 digit number (SSN) assigned to him.

C. Narrative Description of the Proposed System and Its Integration into the Existing Manual System

Library requirements are for a batch-mode, magnetic tape oriented system using a stand alone data collection device. The proposed system should also be able to accept update information from tab cards. The master file (tape) in the computer center will be updated daily (except Saturday, Sunday, and holidays) through a machine readable (tape) record captured in the library by means of the C-Dek, and by means of control cards (tab) also prepared in the library. Updating of the master tape will be accomplished by adding to the file all library materials with charge records, deleting from the file all library materials with return (discharge) records; and adding, deleting or replacing records by means of tab cards. Charge records will be generated at the Loan Desk on the C-Deks by merging information from the patron's ID card (his SSN) with information from the book card (call number plus 29 characters of the title) with control information (type of transaction, loan period, and type of borrower). Discharge records will be created at the Loan Desk by inserting the book card into the data collection device and using the return key on the keyboard. Once a day the tape and control cards will be carried to the UCC where they will be merged into the computer record and used to prepare the various reports.

Because of the existing organization of the Loan Desk and the variety of library materials handled by the circulation system, it will be necessary to continue the manual system for the forseeable future. The proposed system cannot handle the following classes of material or circulation intervals: 1) U.S. Government Documents (because of character set limitations), 2) Any item without a machine readable book card (tapes, curriculum materials, microforms, maps, etc.), and 3) Any circulation interval of less than two days. In addition, the manual system will be continued in order to supply needed system back-up. The Loan Desk cannot accept any down time in its loaning operations. It is imperative, therefore, that some means always be available for checking out a book. For this reason we are suggesting that plans be made to maintain the McBee card manual system for at least five years. It is anticipated that during this period a major portion of the circulation work can be shifted from manual to automated processing and the need for a manual system reevaluated at the end of that time.

January 31, 1978
PR# 11664-010

UNIVERSITY OF WISCONSIN
JANUARY 1978

D R A F T

PROJECT DEFINITION FOR AN AUTOMATED CIRCULATION SYSTEM FOR THE UNIVERSITY OF WISCONSIN-MADISON LIBRARIES

Library Report #20
Administrative Data Processing
Prepared by Jim Muehlenberg
January 31, 1978

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I. PROJECT BACKGROUND

1. Introduction

This Project Definition describes the objectives and scope of the proposed automated circulation system for the University of Wisconsin-Madison libraries. It is written to clearly document the type of circulation system desired by the Chancellor's Library Coordinating Council and to describe the library environment of the proposed system. In addition, alternative methods of obtaining a working system are outlined. All further work toward building or acquiring the desired system will be based on the decisions reflected in and resulting from this report.

The purpose of the project is to obtain a computer-based circulation system that meets the needs of the libraries represented by the Library Coordinating Council. Presently, these include Memorial library with its dozen branches, and the four professional libraries--Agriculture and Life Sciences, Engineering, Law and Health Sciences. The system must fit within the campus long range plans for library automation and the emerging national library network, and should be suitable for eventual use by other campus libraries and resource centers. Detailed descriptions of these constraints appear in later sections.

The Administrative Data Processing (ADP) study leading to this Project Definition has been chartered and funded by Joseph H. Treyz, Director of Libraries. Over the past two years, much discussion, planning and research have taken place throughout the libraries, in ADP, and with sister institutions. External developments in automation have been maturing rapidly. At this time it is appropriate to pull together all the past work and to prepare a plan for achieving the goals already identified.

2. Some Definitions

Library circulation is a group of activities directed toward making library materials (books, periodicals, and others) available to borrow by library users. In a broad sense, the circulation department is responsible for keeping records of all loans of materials and other known absences of items from their designated shelf locations, for maintaining the stacks of books, for developing and enforcing policies aimed at equitable use of materials, and for providing information on collection use as needed.

Circulation staff therefore deal with the library borrowers, the materials in the library collections, and the relationships between borrowers and materials. An automated system is primarily intended to keep track of the borrower/material relationships, freeing the staff to concentrate on the public service, policy and materials handling aspects of circulation. The major relationship transactions to be recorded are the charge (record a loan) and the discharge (process the return of a loaned item).

3. The Library Context

Circulation is one of several interrelated activities within a library. Other major components include the selection and acquisition of materials, the cataloging effort which provides access to the collection, the processing effort which prepares items for use, interlibrary loan, and reference services which aid borrowers in effective use of library resources. The relationships of circulation to other library activities are as important as the circulation functions themselves, in planning for automation.

The association between the library catalogs and circulation is crucial. A patron uses the catalog to determine the library's holdings for a particular author, title or subject. The catalog includes a reference to the shelving location of the item, known as its Call Number. The other information in the catalog describes the material in terms of its contents, authorship, and so forth; this is known as bibliographic information. A separate catalog, arranged by Call Number (i.e., in the same order as items are shelved) is known as the shelflist; it serves as an inventory of the collections.

The catalogs are therefore tools used by library staff and the public to provide access to items on the shelves. The primary function of circulation control is to enable materials to be temporarily removed from their designated shelf locations for use, while maintaining control over their whereabouts. In a sense, the up-to-date locational data kept in a circulation system can be considered an extension of the catalog.

This description is complicated by the fact that some collections have no associated Call Numbers, or no associated shelflist, or even no associated catalogs for access. Included are items owned but not yet cataloged, and items never to be included in the library shelflist--various reports, government documents, microfiche and assorted materials. There the traditional methods of access and control may not apply, and special considerations are necessary to circulate them in an automated setting.

4. Current Situation

Each of the 17 Library Coordinating Council libraries has its own circulation department, and sets its own policies and manual procedures as needed (usually in conjunction with the primary faculty group for that library). Each library may have several circulating collections, each of which has its own variations on the policies and procedures. For example, many libraries designate a collection of reserved readings, set aside for short-term instructional use. Only the Reserve Book Room in College library involves data processing support.

Some approximate circulation statistics are included in the Appendix. The 17 libraries contain over 3.3 million volumes that are available for circulation; each year over 1.3 million loans are made to a primary group of perhaps 60,000 potential borrowers. Each loan involves several manual operations--recording the loan, filing the record, and subsequently retrieving the record after the item is returned. Additional manual operations are required to control overdue library materials--searching the records for overdues, preparing overdue and possibly fines notices. A primary characteristic of these operations is that they are similar across libraries, are repetitive and high volume, and center around creating, checking and maintaining relatively simple records.

5. Current Problems

Following are some of the major problem areas outlined by the Circulation Review Group, a group of nine circulation librarians representing the campus libraries (whose chairperson, Donna Senzig, is the Application Liaison or prime user contact for the project). These problems and the apparent successes of computerized circulation systems elsewhere have led Mr. Treyz to initiate this project.

5.1 The amount of library labor needed to carry out circulation functions.

5.2 Patron effort needed to charge out materials.

5.3 For reserves, neither patrons nor staff can access the record of when a book is due.

5.4 Validation wears off from University ID cards.

5.5 Books that are supposed to be held for another patron get reshelved instead.

5.6 Cannot tell what is on loan to a given patron.

5.7 Need various types of usage statistics.

5.8 Need notice at charge time that patron is delinquent on previous books.

5.9 Need to know whether other copies of a book are available or on loan.

5.10 Cannot tell whether a certain item should not be circulated to a patron.

5.11 Cannot send out overdue or recall notices as frequently as they should be.

5.12 Various "snags" occur with returned books--wrong or missing or unmatched charge cards, book shelved without being discharged.

5.13 Cost of fines notifications too high for effective use.

5.14 Cannot verify patron's University status and affiliation at time of charge.

5.15 Circulation activity is so high at Health Sciences library that the manual system is becoming inadequate.

II. PROJECT SCOPE

6. Project Objectives

The libraries' goals in automating circulation activities are listed in this section.

6.1 Reduce the amount of clerical labor involved in processing circulation transactions.

6.2 Reduce the patron's effort in obtaining and charging library materials.

6.3 Provide rapid access to the whereabouts and availability status of all items recorded in the system from any campus library using the system.

6.4 Increase communications between the library and borrowers, both in frequency and timeliness, to expedite the return of materials needed by others.

6.5 Keep accurate, up-to-date records of materials and their use, both for inventory control and enforcement of lending policies.

6.6 Provide statistical collection usage information for other library needs.

6.7 Integrate automated circulation with existing and future library systems in several other areas--book security, catalog access, interlibrary loan and course reserves especially.

7. Special Considerations

Insofar as possible, the alternative chosen to achieve the above objectives must be able to meet these special constraints and capabilities. They refer not to the circulation activities themselves but to how they are automated and how they relate to peripheral activities.

7.1 Circulation transactions will be processed online, as they occur. I.e., inputs will be made on a terminal linked to the computer, with the response and the data base updates done within a few seconds. Online circulation will generally operate 16 hours per day, seven days per week.

7.2 Each participating library will have one or more terminals, depending upon its volume and upon other needs to be identified later, at least one of which will be a general-purpose keyboard/display (CRT) terminal.

7.3 Patrons should be able to conduct their own circulation transactions--primarily charges, possibly renewals, holds and queries. Machine-readable inputs are needed for this ability.

7.4 Pieces to be circulated will be permanently labeled with a machine-readable number. Numbers will be unique across the entire campus. Bar coding is a good candidate, due to its reliability, permanence, cost, and readability with both handheld, fixed-distance and variable-distance scanners.

7.5 The University ID card should be used as machine-readable patron input, presumably with a compatible type of label included.

7.6 The general-purpose CRT terminals installed for circulation should be usable to access other online applications, both on the ADP computer (payroll, accounting, student names and addresses, etc.) and on regional library systems (cataloging, acquisitions, interlibrary loan, etc.). Further local systems such as serials management must also be accessible.

7.7 A user in one library must be able to query all items in the data base for all other libraries on campus, to determine holdings (to an extent limited by the amount of data conversion) and item availability.

7.8 The system must accommodate dozens of different circulation policies (one or more sets per library), and be flexible to accommodate changes in policies within a reasonable range.

7.9 While patron and piece ID numbers are normally input from machine-readable labels, the system must allow these numbers to be keyed in on the CRT terminal in several situations: if the patron does not have his ID card, following any temporary periods of online system unavailability, and possibly others.

7.10 An item must be circulatable without prior entry of bibliographic data into the system. Deferred entry of bibliographic data provides for increased quality control and eliminates need for a complete pre-conversion.

7.11 The MARC II communications format is the national standard for representation and exchange of machine-readable cataloging data. In general, any library automation efforts of the Madison campus must be built upon MARC compatibility. In particular, local systems must be able to accept data in standard MARC format; also, data elements must be stored in such a way that a MARC format file can be created from the local data base.

For circulation, this generally implies that all bibliographic data elements needed in the system be either created from MARC sources such as OCLC tapes, or be stored in such a way that a MARC format tape can be derived from the circulation data base. This does not mean that a full bibliographic record is required; only that the MARC characteristics be preserved for all converted data. An exception to this constraint might arise if non-MARC data conversion will meet circulation requirements and can be used to later extract corresponding MARC data from external sources.

8. Assumptions and Givens

Further clarification of the project is provided by these paragraphs.

8.1 Who? Primary users will be the Library Coordinating Council libraries, although the smaller ones may not participate early or at all. Other targets may include the Instructional Materials Center, Wisconsin Interlibrary Loan Service, Labs for Recorded Instruction and the State Historical Society; UW-Parkside has also expressed interest.

8.2 What? The circulation system will be based on minicomputer(s). They are well suited for online transaction processing, and can be dedicated to specific assignments and be available during library hours.

8.3 Where? Terminals will be located at major circulation public service points and possibly near the library catalogs; the minicomputer(s) would likely be housed in ADP's computer room or possibly Memorial library. Either direct cabling or use of telephone lines would provide the communications.

8.4 When? No firm target date is established. Certainly no less than a year is needed regardless of the alternative chosen; development could easily take two years or more. Library priorities and resources will dictate which libraries are the first to use the system; the intervening time should be useful for implementation planning and at least partial conversion (labeling, data entry of pieces).

8.5 How much? A system for the Madison campus will eventually involve large quantities of resources: 25 circulation terminals, 1.3 million loans annually, peak loads of one transaction per second or more, 200,000 absence records at a time, 60,000 patron records, 1 - 2 million labeled pieces and piece data records, millions of notices and records exchanged with other systems, 16 hours per day of service, perhaps $300,000 annual total costs.

9. Major Functions Included

Functions are the activities which a system can perform. By listing the functions, we are defining the scope of the desired system.

9.1 Charge - record the loan of an item to a borrower or department after checking the borrower authorization, item availability and determining the loan period. Printed evidence of the charge will include date (time) due. A borrowing department may then loan the item to a primary borrower.

9.2 Record other usage - inhouse circulations may be recorded for statistical purposes. These are completed circulations, with no specific borrower.

9.3 Record missing items - items absent from designated locations and not on loan will be recorded. Periodic searches can be scheduled for these items, and the absence record updated.

9.4 Renew a loan - the original loan period can be extended if no other borrower needs the item.

9.5 Place holds - prospective borrowers can request that the next copy of an item that becomes available be held for them. Normally a check is made to verify that all copies are absent. The library can hold an item for internal use as well.

9.6 Cancel holds - either the patron or the library may cancel a hold, if necessary. Included in this function is the ability to query holds.

9.7 Discharge - returned items are checked-in, updating the loan record. At the same time, any holds placed by prospective borrowers cause the item to be set aside. A discharge receipt or routing slip may be needed.

9.8 Recall - a patron may be asked to return an item after a given time, often before it is due, when needed by another borrower (or department).

9.9 Notify of availability - the next borrower in the hold queue is notified when a requested item becomes available.

9.10 Notify of overdue - notices are sent at specific intervals reminding borrowers of due materials. Variations can include pre-due as well as overdue notifications, or simply a list of outstanding loans.

9.11 Query - the system data base can be queried by Call Number or by the bar code number on a piece to determine absence status. A second query type would be by borrower (or department) number.

9.12 Assess fines - based on the length of time overdue, fines can be computed and assessed. The borrower, the Bursar's Office and the Registrar are notified. Damage/loss assessments can be entered at the time a staff person declares the item damaged, or a standard charge may be automatically levied after a given overdue period for an item assumed lost.

9.13 Block privileges - based on certain levels of abuse of borrowing privileges, a borrower may be automatically blocked from making further loans. Blocks can also be manually entered. Notification may be sent.

9.14 Remove block - upon rectifying the block-causing situation, the block against borrowing privileges is cancelled.

9.15 Prepare for circulation - a piece must be labeled and data eventually entered to the computer file--the label number, Call Number and other control information such as location and loan period. Updates to these data are possible.

9.16 Allocate - the library may change the shelving location of an item for a short or long term--e.g., when it is put on reserve, placed in compact storage, put in a topical display, etc. Rather than modify the library catalogs, the control information is modified in the data base.

9.17 De-allocate - undo the allocation process.

9.18 Produce statistics - various types of tabulations may be generated, based on circulation transactions saved for statistical purposes (less the borrower's identification).

9.19 Route items - when transporting books and other materials between libraries, the system can record the sending and the receipt of items in transit.

9.20 Purge records - completed loan records will be periodically purged from the online data base, although retained on computer tape for statistical purposes (less the borrower's identification).

9.21 Inventory - for libraries converting entire collections, portable label reading equipment can be used to scan all shelved materials to facilitate the inventory-taking process. These inputs are compared to the data base to detect missing or misshelved items.

9.22 Search requests - queries made of the data base on behalf of a patron's request can be automatically recorded, providing information on items requested.

9.23 Maintain historical records - records of loans with problems (overdue with fines assessed, item lost or damage) will be maintained online as long as needed to process billings and appeals. The queries listed in 9.11 will also access these records.

10. Major Functions Deferred

The following functions are related to circulation functions but are beyond the scope of the present project. Each of these may be already available in another system, as described in Section 11, or may become the object of a future project as library needs and resources permit.

10.1 Fine accounting - Coordinating Council libraries do not even collect fines and damage/loss charges; this is the Bursar's Office responsibility. Probably also excluded is recordkeeping of appeals, fine cancellations and reductions, which would be handled manually since they are small in number and originate outside the system.

10.2 Catalog searching - online queries by author, title, subject, course, etc. (Query by Call Number is included; also, see remarks under Section 11.7.) This area will be comprehensively addressed by the Committee on Bibliographic Control.

10.3 Name searching - online queries by borrower's name will probably not be included in the system, unless we adopt an existing system which already has the function. The ADP computer provides name searching for students and employees. (Query by borrower's number is included, once that number is obtained from ADP name searching.)

10.4 Materials booking - scheduling audio/visual materials for use in a particular time frame.

10.5 Course reserve processing - recording faculty requests for reserved reading, obtaining materials for reserve, managing the collection (circulation, allocation and some statistics generation are included).

10.6 Interlibrary loan processing - receiving, handling and filling requests (circulation and some statistics generation are included).

10.7 Shelflisting - the system cannot serve as a shelflist until the holdings are complete, which may never happen for the entire campus. Even then, most bibliographic data will be lacking.

10.8 No-use reporting - it will not be possible to generate a report of all items that have not circulated, unless records of all items are in data base.

11. Interfaces to Other Systems

While the circulation system does not include certain functions, it must be capable of operating in conjunction with these external functions. By interfacing to another system, we mean the two systems exchange data or operate in close coordination to achieve a common goal. Whether a particular interface will be batch or online will be determined later.

11.1 Reserve book room (RBR) system - the new circulation system will replace the circulation component of the automated RBR system, including individual patron notices such as overdues. The weekly usage statistics will be derived from the records of the new system automatically. The RBR system will continue to produce reports for faculty and Reserve staff use as before, with all RBR bibliographic data.

11.2 Theft detection systems - many campus libraries have or plan to install electronic theft detection systems. All but one are currently the 3M Tattle-Tape product, which works by detecting the state of a bistable element in each item. This element is turned off when an item is charged out, and should be turned back on upon return or if the item is a reference book. Some sort of interface is needed, compatible with the constraint of patron self-service charging; until it is available, and for libraries not using electronic theft-detection, the printed transaction receipt generated during the charge will serve as evidence for exit checking.

11.3 Fines and holds system - library fines are computed by the circulation system (although variable damage/loss assessments may have to be done manually); fines are turned over to the Bursar for collection when they exceed a given threshold amount. The Registrar's fines and holds system maintains records of all University-related fines (dollar amounts only), and their corresponding academic holds. Therefore, once fines are generated, the library need only keep records for reference and for cases of appeal by borrowers. The interface becomes more complicated if the library imposes privilege blocks based on unpaid fines; then the Bursar must feed back information on a patron's balance.

11.4 Student and employee data systems - the circulation system needs several data elements about each patron--name, current campus address and possibly phone number, and University status and affiliation. The University ID number will likely be used as the patron ID number. These will be derived from data bases on the ADP computer. In addition, similar data on non-University borrowers will be maintained by the libraries in ADP data bases.

11.5 University ID cards - the libraries prefer to use the campus ID card for circulation transactions. This implies a need for a machine-readable label of some kind, and the ability to issue similar cards for non-UW-Madison library patrons.

11.6 Interlibrary loan systems - the circulation system can charge an outgoing item from the stacks to an interlibrary loan office; it in turn can charge the item to the requesting agency or individual. Incoming material obtained from off-campus by campus interlibrary loan offices would probably not be handled by Madison's circulation system.

11.7 Catalog systems - several connections are possible. If brief bibliographic data are desired for inclusion on system outputs (terminal displays, printed notices), they can be stripped from existing machine-readable data bases such as the OCLC archive tapes and stored in the system data base. Also, if Madison holdings are searchable someday in an online catalog, such searches can be linked to the circulation files to provide absence status information at the same time. In both cases, Call Numbers can be the method of linking the catalog to the circulation files.

11.8 Non-library ID checking system - other non-library campus agencies such as student health and the athletic facilities may wish to use the machine-readable campus ID card and the online library file of patron status information to check the current University status of students and employees. A simple terminal with a label scanner could provide such a service with little additional development or impact on the circulation operation.

III. PROJECT PLANS

12. Implementation Factors

Now that we have described what kind of system is wanted, we must begin planning for how to obtain such a system. These plans are constrained by the resources and implementation priorities of the Library Coordinating Council. These points and any others should be clarified by library management.

12.1 The date by which the system must be operational is one constraint. Dates may be established for each library or library group, with the earliest such date becoming the target for at least a pilot installation.

12.2 Other planned automation activities may further constrain the target date for implementation. For example, the need to close the card catalog around 1980 and begin a new form of catalog may imply a desire to complete the circulation project before then. Similarly, if the library wishes to begin a serials management project in the near future, this may affect the circulation project.

12.3 We must decide whether our objective is to obtain a system for Madison only, which could potentially be transferred to other UW campuses, or whether we are actively seeking a system to export as part of the project. In the latter case, more input and more development work are called for; possibly a system-wide task force such as that used for developing the requirements of the Washington Library Network is needed. (Several UW campuses have already purchased or are planning to purchase commercial systems.)

12.4 Madison's plans to cooperate with other library institutions having similar project objectives also influence project planning. We may need to redefine or clarify our cooperative development plans assuming external project funding becomes unlikely.

12.5 The amount and timing of money to finance system development efforts is a large and real constraint. The current annual development budget at Memorial library can cover the author full-time and another ADP programmer/analyst only half-time for library work.

12.6 The amount and timing of money to finance possible one-time capital investments and to finance recurring operating expenses is a comparable constraint; the libraries will either buy outright, rent or lease a considerable amount of data processing and communications equipment and associated software, supplies and services.

12.7 The amount and timing of library resources to support a massive conversion effort is important. This initial conversion could likely cost $200,000 or more. (Both this conversion effort and the operating costs listed under 12.6 will increase with inclusion of electronic theft detection systems; resources for circulation must be planned for with security systems in mind.)

12.8 Priorities for implementation of specific system functions and interfaces must be established. For example, the libraries may choose to defer interfaces to catalog systems and security systems until such time as they are more applicable. A related concept concerns what functions the libraries might be willing to alter or forego if necessary, depending upon available resources and system offerings.

12.9 A philosophical consideration is the extent to which this campus wants to build upon work done elsewhere; i.e., even if adequate developmental resources are available, do we prefer to avoid building another circulation system if possible? Of course, we will want to tailor whatever system we obtain to fit local needs.

12.10 Another area needing clarification is whether plans for piece data conversion and a revised campus ID card should wait until the circulation system is known, or do we move ahead in these critical areas to maximize progress in preparing for automation, and require that the eventual system be compatible with labeling and data decisions. Health Sciences library's need to conduct an inventory of its entire collection may relate to this decision.

13. Needed System Components

A total, working circulation system is a combination of four general categories of components. All of the components in all of these categories must be obtained for the Madison campus to have a successful automated circulation system. The project may therefore be described as an organized effort to acquire or develop the following component categories.

13.1 The first category may be referred to as the technical environment. It is the basic minicomputer foundation upon which the automated system will be built. The project technical environment is crucial for several reasons: it will determine the performance and response time of the online system, and it will likely be used for future library automation efforts at Madison. The minicomputer technical environment distinguishes this project from all others pursued by ADP, which use ADP's large central computer and standard IBM-compatible terminals. Components of the technical environment category include:

13.1.1 The minicomputer system and file storage;

13.1.2 The circulation terminals and associated communications links; and

13.1.3 The supporting software needed to operate the hardware and to provide a means of handling the circulation software.

13.2 The circulation package is the second category. The package is what actually carries out the functions of automated library circulation. Components are:

13.2.1 A comprehensive design of the data files, inputs and outputs and processing features;

13.2.2 The computer programs or application software written to execute the design; and

13.2.3 System documentation enabling operators to use the package, and perhaps assisting programmers to modify the package as needed.

13.3 Interfaces to other systems form the third category of system components. Detailed knowledge, guidance and proper interface protocols are needed in selecting and installing these components. The specific interfaces outlined in Section 11 generally fall into two components:

13.3.1 Interfaces to local administrative systems; and

13.3.2 The circulation system's role within the local/regional/national library network, including links to catalogs of bibliographic data.

13.4 The last category is that of implementation procedures; obtaining a functioning circulation package is only half the total project effort. Others experienced in successful implementation are in a position to provide the guidance for these components. Included are:

13.4.1 Conversion plans, strategies and procedures needed to prepare library materials and patron identification for machine-readable transaction input; and

13.4.2 Operational procedures to successfully integrate the computer-based components into the library environment.

14. Possible Participants

Given an outline of the components that must be obtained, we consider the possible institutions and private concerns which might provide or develop the components. None of these should be considered selected or necessarily committed to the project at this time, aside from the first participant.

14.1 UW-Madison is obviously involved; the libraries are represented by the Application Liaison, the Circulation Review Group, and ultimately by the Library Coordinating Council directors. Working with the libraries is ADP, represented by the author and other programmer/analysts and management.

14.2 University of Chicago Library Systems Development Office staff may be participating. Chicago's goals are comparable to those of UW-Madison; cooperative planning and fund-seeking activities have already occurred, although external funds have not been obtained.

14.3 Other library institutions which have or are developing minicomputer-based circulation systems and who anticipate sharing the results of their work comprise a category of potential partners in the project. Further research, contact and negotiation are required for any possible participation by institutions in this category. One example might be the National Library of Medicine.

14.4 Commercial vendors of circulation systems are a possible source, on a seller-buyer basis. Examples of vendors offering complete systems are CLSI, DataPhase, Cincinnati Electronics, 3M and others. UTLAS (University of Toronto Library Automation Systems) is selling the system developed for the University; even though they are a University department, their relationship with the outside world is similar to that of the commercial vendors. With these vendors, Madison would evaluate the packaged offerings and purchase the most appropriate system.

14.5 Finally, minicomputer manufacturers and outside systems development contractors may be considered. These do not offer the same types of solutions as the previous potential participants and should be viewed as subcontractors to the prime project participants.

15. Some Alternatives

By combining various possible project participants and analyzing what system components they can provide, we establish various alternatives for UW-Madison. These all include aspects of three basic approaches to obtaining the desired system, namely building it from scratch, adopting it from another institution, or buying it from a vendor. It is likely that a combination of these three will be needed.

The following table presents assumptions concerning what components could be obtained from which sources. These are generalizations but should give an indication of strengths and weaknesses.

Assumed Availability of System Components from Possible Project Participants

	UW-Madison	Univ. of Chicago	Other Institutions	System Vendors
Technical Environment:				
Minicomputer system	--	--	yes	yes
Terminals	--	yes	yes	yes
Support software	--	--	yes	yes
Circulation Package:				
Comprehensive design	--	yes	yes	yes
Programs	--	?	yes	yes
Documentation	--	?	?	yes?
Interfaces:				
Administrative	must provide	--	--	--
Library network	--	yes	?	?
Implementation Procedures:				
Conversion	--	yes	?	yes?
Operational	--	yes	?	yes?

Legend: -- means not available; yes means available; ? means partially available, or of questionable applicability, or don't know.

By combining the component availabilities for several possible partnerships, we have the following possible alternatives. Obviously, the amount of resources needed for each alternative will depend in part upon the number of components available from the participants.

15.1 UW-Madison alone would have to do the entire project from scratch, merely relying on the literature and general experiences elsewhere.

15.2 UW-Madison and the University of Chicago would build upon Chicago's designs, knowledge of the library network interfaces, and implementation experiences. We would have to develop the technical environment then redo the circulation package as needed to fit that environment; the administrative interfaces are also needed (as they are going to be in all alternatives). This was the effort described in an earlier joint proposal.

15.3 UW-Madison and other library institutions could potentially cooperate. We may get a working system with or without all necessary interfaces and implementation procedures. A possible method would be a transfer of designs and programs and documentation to Madison for local modification and enhancement and installation; the technical environment would be included. It is too early to tell whether closer participation is possible.

15.4 UW-Madison and commercial system vendors are a possible combination. Madison would develop a Request for Proposal, evaluate vendor responses, and buy a system. Lacking may be the needed interfaces and implementation procedures, but the first two categories should be complete. Vendors may not desire to provide documentation allowing for local modifications.

15.5 UW-Madison and the University of Chicago could team up with another library institution, obtaining the latter's technical environment and circulation package, modifying as needed. Madison would obtain a complete system after providing necessary local administrative interfaces.

15.6 UW-Madison and the University of Chicago could also build upon a commercially-available system. This alternative is similar to the previous one in terms of delivered components, but the procedures of development may differ greatly. One feasible vendor might be Cincinnati Electronics, which has established a relationship with Chicago.

16. Next Steps

The Library Coordinating Council will formally review and approve (some version of) this Project Definition. Next, the implementation factors in Section 12 must be considered and clarified, and any others introduced. In the meantime, ADP can continue research into offerings of other institutions and vendors. The campus must ultimately decide upon an alternative, which will be constrained by external offerings and available resources.

January 31, 1978
PR# 11664-010

Appendix

Estimated Circulation Statistics for Major Madison Campus Libraries

LIBRARY NAME	TOTAL CIRCULATIONS PER YEAR	AVERAGE CIRCULATIONS PER DAY	PEAK CIRCULATIONS PER DAY	AVERAGE NO. OF ITEMS ON LOAN	TOTAL ITEMS AVAILABLE FOR CIRCULATION
Agriculture	94,000	290	700	4,600	90,000
Art	42,300	230	390	8,000	75,300
Biology	15,000	50	160	3,000	30,000
Business	40,000	150	640	500	39,000
Chemistry	8,000	30	50	360	9,600
College	257,000	720	2,160	4,500	107,000
Engineering	67,900	240	350	4,300	809,000
Geography	20,500	70	310	1,600	40,000
Geology	15,800	50	130	1,700	32,000
Health Sciences	273,500	770	1,800	10,000	160,000
Law	31,600	100	200	700	36,000
Mathematics	14,000	50	100	1,200	24,400
Memorial	368,800	1,040	1,700	57,000	2,000,000
Music	-	-	-	-	-
Pharmacy	74,600	270	420	1,050	26,900
Physics	6,300	30	60	550	10,000
Social Work	3,000	-	-	-	4,000
TOTALS	1,332,300	4,090	9,170	99,060	3,493,200

ON-CAMPUS BORROWERS - Approximately 60,000

NOTES:

(1) These figures vary in accuracy; the oldest are taken from 1972/1973 data.

(2) The Reserve Book Room is included in College Library data. Its portions of the College figures are:

210,000	Total Circulation per Year
1,500	Average No. of Items on Loan
64,000	Total Items Available for Circulation

(3) The Music Library is included in Memorial Library data. Its portion of the Total Circulation is 28,800.

(4) Social Work Library's figures are rough estimates.

(5) Of the Total Items Available for Circulation, some 979,400 items are not currently represented in a shelflist (of these, about 110,300 are awaiting cataloging and will eventually join a shelflist). These 979,400 items account for 200,900 of the Total Circulations per Year.

(6) The Total of Peak Circulations per Day may not represent a campus daily peak.

(7) It is unlikely that all of the Total Items Available for Circulation will actually circulate.

IOWA STATE
SEPTEMBER 1969

AUTOMATED SYSTEM TO BE INSTALLED IN CIRCULATION DEPARTMENT

The library's automated circulation system will become fully operational at the beginning of Summer Session II, July 15, 1969. A prime requirement of this system will be that each user be issued a machine readable, laminated identification card. This card is presently being issued to undergraduate and graduate students as they are registered. The Registrar's Office, in addition, is currently collecting from departmental and administrative offices the names of individuals eligible to receive faculty library privileges. The faculty identification cards which will contain faculty name, social security number, date of issue and signature, when completed, will be delivered to the appropriate department for distribution to individuals.

The library patron will find that the new system will greatly facilitate the checking out of library material as the need will no longer exist for hand written slips or signed book cards. The automated system requires only that the patron present his ID card and library materials which he wishes to borrow to the assistant at the circulation desk. The attendant will then insert the ID card and the master punched card from the book pocket into the appropriate slots provided in the IBM 1031A Master Input Station at the counter. This device will record the transaction electronically on an IBM 1034 card punch at the Data Processing Center. The punched card will be reinserted into the book pocket together with the appropriate date due slip and the book and ID card will be returned to the borrower, transaction completed.

Each day with the exception of Sunday a computer generated, updated, print-out will be provided to the Circulation Department. This print-out will indicate the status of each book not shelved in the stacks as of midnight of the preceding day. A borrower may recall or reserve any book in circulation by filing a recall slip at the desk. This slip will be converted into a punched card which then can enter the data processing system which will generate the necessary notification forms to retrieve and then notify the borrower when the book is returned.

The seven day grace period after date due before a fine is assessed will be continued. It is planned that overdue notices will be generated by the automated system and sent via U.S. mail the day after a book becomes due. By placing an overdue reminder in the hands of the borrower several days before the expiration of the grace period, the library feels will speed the return of overdue materials while at the same time significantly reducing the number and amount of fines assessed our borrowers.

BEST COPY AVAILABLE

Incl #3

AUTOMATED CIRCULATION SYSTEM
PROGRESS REPORT

The decision to automate the Circulation Department made 1968-1969 the year of implementation. The IBM 1030 Data Collection System was selected as the hardware base. While the availability of trained Customer Engineers in the area was a powerful element in this choice, correspondence with Mr. R. W. MacDonald of the University of British Columbia and the successful history of the system at Fisher Governor Co. of Marshalltown, Iowa strongly supported such a choice. The hardware chosen, the card format designed, the task before us for the year was to keypunch the collection, aid Data Processing in the design of programs, and prepare for the human and machine problems that accompany any change.

The initial cadre of keypunch operators, all students, were trained by Mrs. Zola Obe of the Data Processing Center. By September 1968 a full-time supervisor had been selected and trained for the Library's operation. Miss Mary Davis, with the help of two to five part-time student keypunchers, put into machine readable form 250,000 book-cards in the year 1968-1969. In addition to the keypunching operation there was the painstaking chore of sight verifying each card. This was done by a dedicated corps of student assistants drawn largely from the work study pool maintained by the Financial Aids Office.

Liason with the Data Processing Service was through Mr. Lester Carlsborg. Mr. Carlsborg was extremely adept at funnelling the ideas of the Library to his programmers and then interpreting the programs to the Library personnel in a manner meaningful to all. All options were fully explored and then relayed to Mr. McNee for final decision. Mr. McNee would equate cost to service and make the decision on the basis of optimal service at reasonable cost.

Dean Arthur Gowan and the Assistant Registrar, Mr. W. Dean Nelson, were indispensible in the preparation of Borrower's Cards. They designed and implemented laminating and punching over 20,000 cards. Not only did their group perform the mechanical work of this operation, but they were instrumental in offering suggestions that greatly facilitated the ease with which the system was implemented. Such matters as the distingushing of Undergraduate Cards from Graduate Cards were solved by an interplay between their office and the Library. The first suggestion was a different colored lamination but after a trial run this was found to be cumbersome and expensive as it entailed the issuance of new cards at the time of the student entered the Graduate College. As an alternative, Mr. Nelson experimented with an embossing machine and found this to be fully adequate for the Library's needs and much more economical in time and materials.

The University of British Columbia supplied us with their working papers which were of inestimable value in implementing our system. The problem of what to do with the borrower who had not been issued his permanent badge or who had arrived at the Library without his badge was solved by a careful reading of these papers. A piece of railroad board, cut by the same fixture used to cut the laminated badges, was found to be acceptable to the IBM 1030 Control Stations and of negligible cost, less than four cents each.

Fisher Governonr Co. provided the concept for an ingenious labor and equipment cost saving device, a loan period switch. This switch eliminates the need for a cartridge attachment or a manual keyboard to input date due instructions to the system. Attached to the top of the input stations, it can easily be set to input up to ten different variable bits of information onto the transaction card.

A by-product of the keypunching operation has been the design and feasibility study of a semi-automated new acquisition list. A keypunch program was devised that expanded the contents of the book-card into a modified bibliographic entry. The book-card was designed to include the LC Catalog number, the Cutter number, the year of publication, volume number, copy number, accession number, item classification (monograph, periodical, serial, undergraduate collection, etc.) and an eleven letter truncated main entry. The program permitted the creation of a multiple card pack that would contain pertinent parts of the original book card together with full main entry and short title entry. The design further permitted these cards to be run off as card images on the IBM 1401 at a machine cost of about six dollars a month. In a trial run made over a two month period, it was found that these cards could be generated at an operator cost of approximately one-half over that required to prepare the regular book-card. Thus the Library is prepared to issue a new title list at a reasonable cost in time and money.

Another feature of this project is the creation of a tape file of our collection. Each card is sent to Data Processing for duplication and these duplicate cards are transferred to magnetic tape at regular intervals. This creates a machine-readable file that may be manipulated to provide an analysis of our collection, an inventory list, and such other uses as need might dictate.

The configuration of equipment follows:

Circulation Desk
2 IBM 1031 Model A7 Card and Badge Input Control Stations.
1 IBM Model B7 Card and Badge Input Satellite Station Discharge Area
1 IBM Model B7 Card and Badge Input Satellite Station Undergraduate Area
1 IBM Model B7 Card and Badge Input Satellite Station Data Processing Service
2 IBM Card Punch Output Stations with Day-of-Week Read-In, Digital Time Read-In and Line Transfer
1 IBM 1032-1 Digital Time Unit with Day-of-Week Read-Out and Digital Time Read-Out

The placement of the two pieces of equipment at Data Processing eliminates the need for manual transfer of the transaction cards to another building and provides a corps of trained technicians to maintain continuous operation of the equipment. These units are connected to the input stations at the Library by cables strung through the heat tunnels.

The borrower's Social Security number is the key to our system. A laminated badge is provided to each student and faculty member with this number punched into it. The badge is intended for eventual use as a university wide ID card as well as a Library card. For those individuals eligible to use the Library's resources who are neither registered students or faculty members, the Library will issue a laminated badge.

An "eligible borrowers list" is being compiled by Data Processing Service from the records maintained by the Registrar's Office, and the Personnel Office and the Library. This list, stored on tape and updated daily, will become an essential feature of the system. It will serve as the data base for the notices, statistical summaries, and borrower control. In printed form, it will provide Library personnel with the tools necessary to verify borrowers' eligibility and to instantly indentify the location of all books currently in circulation.

Each day, except Sunday, the Circulation Department will be furnished a print-out of all books on loan from the Library. This print-out will be arranged in LC Catalog Number Sequence and will contain, in addition to the information on the punched book card: the borrower's identification number, the date checked out, the date due, and the overdue status of the book. All notices will be prepared by the computer and will be mailed to the borrower's home address. All fines, other than those paid at the time books are returned, will be accumulated and billed once a month through data processing. In addition to the print-out supplied to the Circulation Department, there will be a print-out distributed on the floors and tiers of the Library so that each segment covers the contents of an individual floor or tier.

A wide variety of statistical summaries will be provided by the system. The borrower's class code, originally devised to alert the Circulation Department to a ineligible loan condition, will have the added value of providing the Library with a statistical summary of circulation by borrower's status (i.e.: Undergraduate, Graduate Student, Faculty, Clerical Staff, townspeople, Administrative Staff, or research oriented affiliated institutes.)

September 16, 1969

THE UNIVERSITY OF NORTH CAROLINA LIBRARY
CHAPEL HILL, NORTH CAROLINA
27514

July 10, 1975

Automation of Wilson Library Circulation.

by A.R. Fields, Circulation

I. Chronology of development.

June 14, 1966	Planning commenced with a summary of the problem and possible solutions by the Associate University Librarian, John H. Gribbin.
Sept., 1966	Library representatives visited three "automated" libraries and prepared cost studies in collaberation with Administrative Data Processing personnel. Developed book card format and standardized keypunched student's identification card.
Dec. 15, 1967	Decision made by University Librarian to proceed with automation of Undergraduate Library only, using Library funds since no supplementary funds were available. Commenced keypunching book cards for all Undergraduate Library books from coded forms.
Jan. 18, 1968	U.L. book cards coded to date: 20,7000. This achieved using services of serials keypuncher half time. Decision made to employ a full time keypuncher primarily for the automation project. Commenced keypunching book cards for all new books coming into Main Library.
June 1, 1969	Commenced inserting book cards in U.L. books. Cards on hand: U.L. 50,886. Main 32,920.
Sept. 15, 1969	Undergraduate Library commenced automated circulation.
Sept. 18, 1969	Started coding book cards for all L.C. classified books in Main, working from the shelf list. Continued coding for all new and reclassified books.
March 12, 1971	Finished coding cards for all L.C. books in main.
July 1, 1971	Estimated 154,699 book cards coded to date.
July 5, 1973	Estimated 240,000 book cards coded to date. Decided to start keypunching cards and inserting directly into books, rather than coding from the shelf list. About 200,000 book cards in backlog were machine sorted and insertion into books commenced.
March 11, 1975	Commenced crash program of inserting remaining 180,000 cards into books, using all available Library personnel during Spring Break. With volunteer aid from nearly all departments and some extra student help the project was completed by July 1, 1975.
June 3, 1975	Linking cable run from U.L. to Wilson. IBM 1030 data collectors installed in Main. Wiring and testing proceeded.
July 7, 1975	Main and Undergraduate Libraries joined into single automated system, utilizing remote keypunch (IBM 1031) in Undergraduate Library.

4

II. Selection of equipment.

Active planning commenced in 1966. All systems of automated inventory control in use at that time required some kind of punched card input except for "on line" systems with direct keyed input. Since this required full-time access to a large computer, the cost was prohibitive. There were no automated systems developed specifically for library use, although various libraries had developed systems using IBM equipment and locally-produced computer programs. With a major IBM plant nearby it was decided to utilize their equipment.

III. Description of the system.

Two IBM 1030 data collectors in the Undergraduate Library and three IBM 1030's in Wilson Library are interconnected to a single IBM 1031 remote keypunch on the ground floor of the Undergraduate Library. There is a back-up IBM 1031 in the same room, with automatic switching in case the primary keypunch goes down.

Book cards are keypunched with a classification number and short title. Student's identification cards, and special plastic badges issued to non-students, are keypunched with the holder's Social Security Number. Books are charged out by inserting the borrower's badge in one slot of the 1030 and a book card in another slot. The information from the badge and book card is combined with type of loan and due date information previously set on the 1030 and is transmitted to the 1031 remote keypunch where a transaction card is punched and stored. At 8:00 a.m. each day the accumulated transaction cards are delivered to the Message Center and from there taken to the Computation Center on West Franklin. These cards are read into a computer memory containing the circulation file. A special computer program adds new charges to the file, cancels charges for books which have been returned, notes books returned overdue, computes the fines, compares the social security number with a master address file, and prints out bills for delinquent borrowers. It also notes which are more than three days overdue and prints out overdue notices.

About 11:30 a.m. each day a printed list of all books in circulation, on Reserve, on carrels, being traced, or out of the stacks for any reason is delivered to both libraries.

IV. Advantages of the automated system.

a. Convenience to borrowers. Not necessary to fill out forms.

b. Eliminates errors due to illegible handwriting and poor carbon copy.

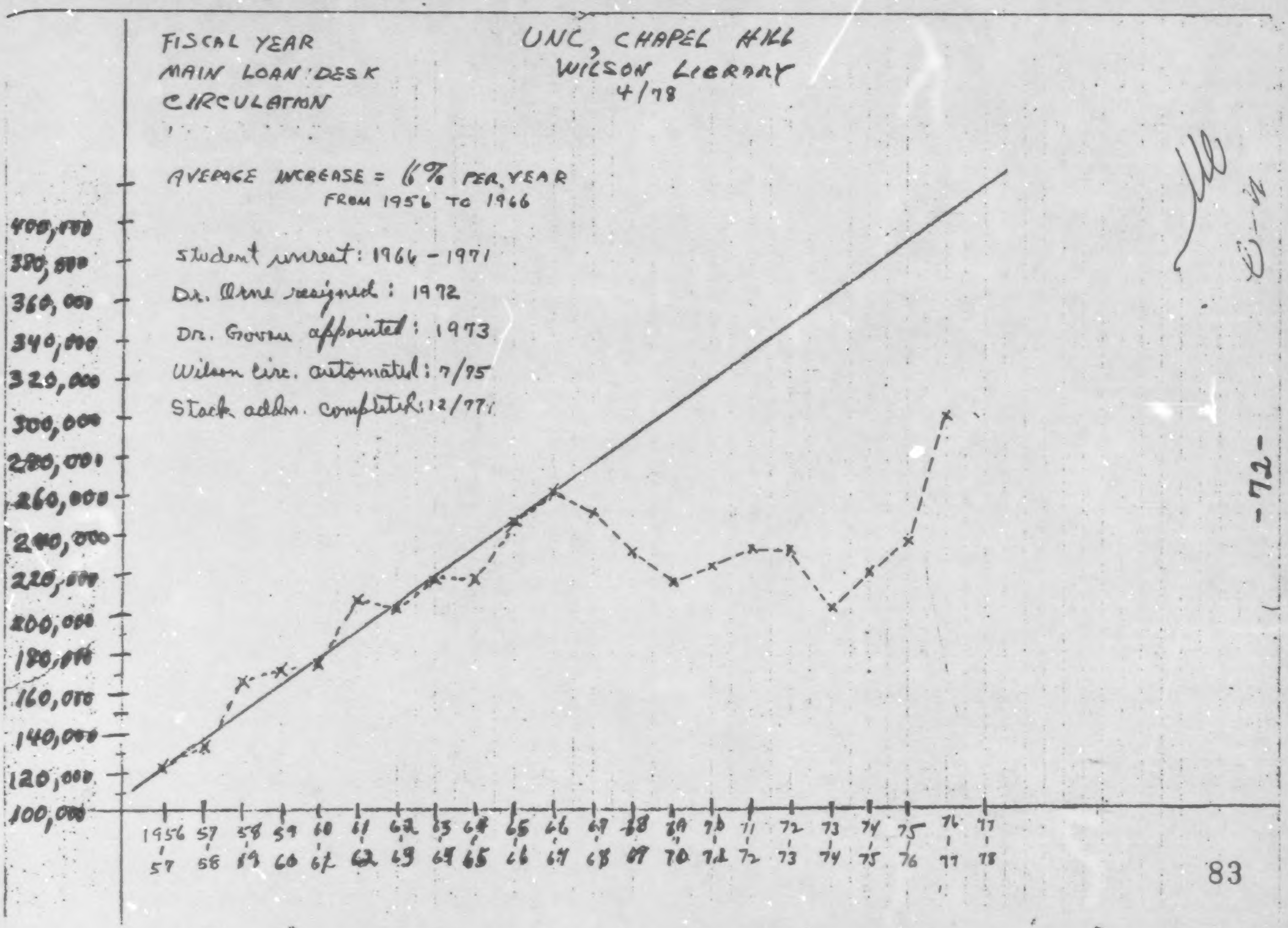
c. Eliminates human errors in filing.

d. Reduces work time in filing, preparation of bills, and removing charges from the circulation file.

e. Permits direct user access to the circulation file.

f. Permits analysis of usage by classification and user category for collection development.

g. Permits greatly-expanded circulation without corresponding increase in staff.


FISCAL YEAR
MAIN LOAN DESK
CIRCULATION

UNC, CHAPEL HILL
WILSON LIBRARY
4/78

AVERAGE INCREASE = 6% PER YEAR
FROM 1956 TO 1966

student unrest: 1966 - 1971
Dr. Orne resigned: 1972
Dr. Govan appointed: 1973
Wilson circ. automated: 7/75
Stack addn. completed: 12/77

RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

INTERDEPARTMENTAL COMMUNICATION

November 10, 1977

To: Ed Pason

From: Barbara E. Sanders BES

Re: Responses to Use of Microfiche Daily Circulation Record at the Automated Rutgers Libraries

The microfiche Daily Circulation Records have been in use at the automated libraries for approximately three months. This has provided time to evaluate staff and patron response to the change. As a part of this evaluation, a survey was conducted from October 5, to October 21st. Circulation Department Heads were asked to consider the survey, staff response, and discuss the responses with their Unit Librarians and evaluate the results.

Summary and Recommendations

1. General acceptance of microfiche is favorable.
2. One paper copy of Daily Circulation Record for each library should be provided.
3. Library should continue those special reports now on paper.

Patron Acceptance

The response to use of the microfiche has generally been very good, except for a few minor complaints. Patron acceptance at libraries has been excellent.

With the microfiche, patrons, for the first time, have access at each major library to the Daily Circulation Records of all the other automated libraries. They find the fiche easy to use, quicker, and cleaner.

Library Staff Acceptance

Staff use of microfiche has been positive at all libraries, except for one major problem at Alexander Library: prolonged use of microfiche - more than three or four hours per day - causes eye strain for staff. Since Alexander Library has the highest volume of circulation, error corrections, borrower maintenance functions, etc., it is expected that more problems would appear more readily there than at any of the other libraries.

Similar problems may develop at other libraries as their volume increases. No other library has reported this as a serious problem so far. A solution would be to provide one paper copy of the Daily Circulation Record for staff use at each library. Each library still receives the following low volume reports on paper: Reserve List, Error Lists, Circulation Statistics Summary.

At Camden A & S Library and Newark Dana Library, the Daily Circulation Record is still being provided on four-part paper by CCIS on each campus. In addition, they are receiving microfiche by campus mail which provides additional copies of their own circulation, as well as those from the other automated libraries.

The system-wide circulation fiche is used mainly for intra-library loan borrowing and staff use. Therefore, the survey did not indicate patron acceptance at Newark and Camden since they are still using paper.

The staff at Dana and Camden find the microfiche easy to use and profitable for its present internal use, but prefer to continue use of paper for Daily Circulation Records as long as possible.

Quality, Reliability, Equipment

Although the acceptance of the microfiche has been very good, the quality and reliability have been only fair. These are problems that CCMS is making efforts to improve, and which I hope will be resolved soon: The quality of the microfiche occasionally varied, with blotches that obscured the records. The microfilm copier has malfunctioned, delaying the production and distribution of fiche on several occasions. Line finders and some swivel bases have still not been delivered after three months. Light bulbs provided have been of inferior quality with very short life.

BES/rg

cc: Circulation Heads

RUTGERS
1977 AND 1974

RUTGERS UNIVERSITY
THE STATE UNIVERSITY OF NEW JERSEY
Division of Personnel

POSTING DATE: 7/5/77 REMOVAL DATE: 7/11/77

ADMINISTRATIVE/PROFESSIONAL VACANCY NOTIFICATION

1. CIRCULATION COORDINATOR

University Library
College Avenue Campus

Salary Range 19 - $11365-15341
Send resumes to R. Thomas, Personnel, N. B., ext. 3020.

Under general direction, responsible for improving automated circulation services and for acting as a resource to university-wide circulation departments in the areas of circulation policy, planning and development.

Evaluates the effectiveness of the computerized circulation system; identifies problem areas and proposes and implements system changes; establishes priorities for programming projects; maintains manuals and provides information and training regarding the proper usage of the automated circulation system; prepares reports on the operation and needs of the system and statistical analyses of circulation activities.

In consultation with the circulation department heads, drafts library policies related to circulation; schedules and chairs meetings with circulation staff; provides staff training programs in public service policy and procedures; disseminates circulation information to department supervisors and other appropriate university offices; performs related duties as required.

Requires a bachelor's degree or its equivalent, plus previous library experience, preferably with automated circulation systems. Some knowledge of computer systems and equipment and demonstrated leadership ability also required.

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253. PROGRAMMER I

Alexander Library
College Avenue Campus

Salary Range 23 - $13815-18652
Send resumes to R. Thomas, Personnel, N. B., ext. 3020.

June 20th posting

Under general direction, works as a senior programming member of a project team in the planning, design, development and implementation of computer programs for major elements of a total library system, with special emphasis on automated circulation systems. Assists in the implementation and application of programs utilizing current software operating systems and multi-programming technology; does related work as required. Assists with the conceptualization of application systems, analysis, design and specifications. Performs the task of program design, program coding and segmenting, program debugging and listing, program documentation and systems implementation in an OS/HASP and OS/VS JCL environment.

Graduation from an accredited college with a bachelor's degree or equivalent education or experience; three years of comprehensive experience in the design and preparation of programs for electronic data processing equipment utilizing current operating systems and multi-programming technology is required. Experience in OS/HASP, OS/VS JCL, data base management and administrative terminal systems, or library automation is desirable.

Proposal for RUL Special Project: Improvement of Automated Circulation System

George A. Carroll
April 5, 1974

Background

The computer system currently being used was designed and programmed by the University Administrative Data Processing Department in 1968-69. The system was implemented in 1969 at the Alexander Library, the Kilmer Area Library, the Library of Science and Medicine and the Mathematics Library. The Douglass Library began using the system in August of 1973 and plans are underway to add the Dana Library to the system in the Fall of this year. The system's design and programming work was the responsibility of George Carroll and George Sullivan in 1968-69. They both left the Administrative Data Processing Department in late 1971 and no significant improvements have been made to the system since its original installation.

Current Problems

1. The Administrative System Department is understaffed and cannot respond positively to the libraries' requests for improvements to the system. They are able to handle only minor changes and these must be scheduled long in advance.

2. The current system is not being used to provide significant amounts of management information to the library. The potential for valuable management information is now increased because more libraries are using the system. (At the recent CHEN Conference, Lois Kirschner of the University of Penn. and Allen Kent of the University of Pittsburgh recently provided excellent examples of the type of information that can be obtained from a properly utilized circulation system.)

3. The University Library system's staff is overloaded with CAPTAIN tasks. This staff is not permitted to do computer programming for the University's Administrative Computer.

4. The Library is still plagued by problems with an inadequate borrower file, deteriorating ID cards and the lack of a collection procedure for fines. (All of the registration, payroll and accounting functions are serviced by the same Administrative Computer Center).

5. We need improved data collection and data communication equipment, especially for the Dana Library and the Camden Arts and Science Library.

RUTGERS
1977 AND 1974

RUTGERS UNIVERSITY
THE STATE UNIVERSITY OF NEW JERSEY
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POSTING DATE: 7/5/77 REMOVAL DATE: 7/11/77

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4. The Library is still plagued by problems with an inadequate borrower file, deteriorating ID cards and the lack of a collection procedure for fines. (All of the registration, payroll and accounting functions are serviced by the same Administrative Computer Center).

5. We need improved data collection and data communication equipment, especially for the Dana Library and the Camden Arts and Science Library.

To summarize, it is time for the library to follow up on the initial success of the Circulation System. We should improve it and solve some of the long standing problems.

Proposal

The Library should hire a System's Analyst/Programmer to work full time toward the solution of these problems. Specifically:

A. Transfer $12-15,000.00 to a University grant account (27 account) to be used to hire a qualified individual on contract. (NOTE: We should agree to do this for two (2) years because of the difficulty of recruiting qualified people on contract for only one (1) year.)

B. University Data Services would be authorized to hire the individual and manage the account. (This arrangement is already being used to support University Student Services functions).

C. The individual will report administratively to U. D. S. and be assigned full time to library projects. Project priorities will be established by the library.

Advantages of this Approach

1. It does not require a budgeted line.

2. It strengthens our relationship with University Data Services (UDS).

3. UDS is in a position to work on registration, payroll, billing and related systems. Library employees are not in this position.

GAC/bt
4/8/74

VIRGINIA'S LAND-GRANT UNIVERSITY

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

SYSTEMS DEVELOPMENT

January 12, 1978

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY
JANUARY 1978

MEMORANDUM

TO: Dr. A. R. Pierce

FROM: T. Uluakar T.U.

SUBJECT: Proposed statistics for management reports

I have summarized the statistics that you indicated to be essential for the management reports of Phase II. I am presenting them here to provide a basis for a yet unscheduled meeting with you to go over them once more. At the end I have itemized some other possible statistics that I feel need to be defined and discussed further in the meeting. Of course, there may be some more additions to this list by you.

TU/rs
attachments
cc: R. Crockett
B. Reid
J. Taylor

1. User borrowing intensity

   a. Total number of check-outs of items to patrons of a given class, during a given period.

   b. Total number of renewals of items to patrons of a given class, during a given period.

2. User reading patterns

   set

   a. Total number of check-outs of items within a given call number range to patrons of a given class, during a given period.

   set,

   b. Total number of renewals of items within a given call number range to patrons of a given class, during a given period.

3. Dollar measure of service to specific groups

   a. Total dollar value obtained by summing number of check-outs of each item to patrons of a given class times its price, during a given period.

   b. Total dollar value obtained by summing number of renewals of each item to patrons of a given class times its price, during a given period.

4. Class activity

   Total number of check-outs of items within a given call number range during a given period.

5. Class dollar utilization

   a. Total dollar value obtained by summing the price times the number of check-outs of each item in a given call number range, in a given period.

   b. Total dollar value obtained by summing the price times the number of renewals of each item in a given call number range, in a given period.

6. Class dollar investment

   Total dollar value obtained by summing the prices of all items in a given call number range.

7. User group population

   a. Total number of patrons in each user group.

   b. Active number of patrons in each user group.

8. Subject population

   Number of items in specified call number range~~s~~ sets.

9. Borrowing period distribution

   Distribution of the number of days an item stays checked out to a patron before it is checked in again, during a given period.

10. Hourly workload

    The hourly distribution of check-out transactions during a given period. (by days)

11. Overdue ratio

    The ratio of the number of items that become overdue to the total number of items checked out, during a given period.

12. Hold/Recall statistics

    Total number holds and recalls placed for items in a given call number range, by a given class of users during a given period.

1. Input statistics from data entry
2. Inquiry statistics
3. Popular authors statistics
4. Popular titles statistics
5. Withdrawals, discards statistics

AUTOMATED CIRCULATION SYSTEM

University of Connecticut Library

Storrs, Connecticut

The University Library began intensive planning for the automated circulation system late in 1972. Preliminary steps included:

(1) the production of a machine readable identification badge for all students, faculty and staff;

(2) the production of book identification cards for each book in the collection giving the call number, author's last name and the title (or partial title) of the book. Cards were key-punched by Data Processing personnel from information on the library's shelf-list cards.

Analysis of library requirements and programming for the system was carried out over a period of about 7 months beginning in early 1973. All programming was performed by the University's Data Processing Department.

General Description

The system is "on-line" to an IBM 370/135 computer (196K memory) in the Data Processing Department. In this way, information in the system is always completely current and inquiries into the files are guaranteed to provide the latest information about the status of a given book.

In terms of machinery, the system consists of:

3 IBM 1031 data collection readers - this unit collects information about a given transaction and transmits it to the computer

3 IBM 1033 printers - this unit confirms the completion of a transaction by printing out a date-due slip which is placed in the book. If a given transaction cannot be completed, the printer prints a message explaining what the problem is; such problems are given to the staff for resolution. (All book charging is performed by student assistants.)

2 IBM 3275 cathode ray tube terminals - one of these units, located in the Catalog area, is solely for public use and allows borrowers to determine the status of a book before searching for it in the stacks

- the second terminal, located at the Information Desk, is for staff use and allows the staff to retrieve information from the circulation files and to make changes and additions to that information as required. The specific functions performed through the 3275 unit are:

1. Determine status of a book
2. Determine status of a patron
3. Enter search record
4. Update book or patron record
5. Enter a recall notice

6. Renew a book
7. Report a book lost
8. Report a book returned
9. Suspend or cancel a fine
10. Display entire transaction record

Batch Processes

Certain functions in the system are performed on a batch basis:

1. Production of reminder and overdue notices (daily)
2. Addition of transactions which were performed manually rather than through the on-line system either because: (1) the book had no book card or (2) the system was down. (daily)
3. Print-outs of books that are being searched, are missing, or are being billed. (as requested)
4. Print-out of borrowers who have been restricted and the reason for the restriction (as requested)
5. Print-outs of lists of books charged to an individual or department.(as requested)
6. Print-outs of eligible borrowers. (as updated by Data Processing)
7. Print-outs of lists of books charged to an individual on extended loan. (end of each semester)
8. Billing (monthly) All financial transactions handled by University Business Office.

Management Information

Programs have been developed to provide management with statistical data. Some of the statistics generated:

1. Number of books circulated by call number, by borrower status, by Dewey or Library of Congress classification.
2. Number of transactions by hour, day, week, month, semester.
3. Average number of days books are overdue.
4. Average number of days taken to return recalled books.
5. Total number of books billed and number subsequently discharged.
6. Total number of books reordered.
7. Total number of searches placed, average number of days taken for a search.
8. Total number of books recalled.
9. Total number of books renewed and how often they were renewed.
10. List of all books circulating more than four times in a semester.

Uses to Which Management Information Has Been Put

Data on the number of books circulated from specific Dewey classes was used to determine which classes of books could most reasonably be placed in storage.

Data on specific books circulated was used in placing Checkpoint labels in books and in the reclassification of books.

Data on number of transactions by time period has been used in scheduling staff at Circulation Desk.

Data on titles charged out frequently has been used in the ordering of additional copies of those books.

Future Adaptations

Data collected from the book information cards of new books will soon be available to library users as a New Book List issued on a monthly basis. University departments will be profiled, the parts of the Library of Congress classification that relate to their work will be determined. Selected parts of the new books list will then be sent them on a monthly basis. The Acquisitions Department of the library will be able to determine more accurately those subject areas which the library is supporting and those which need additional support.

A detailed 71 page report on the system is available for purchase at $7.00 a copy. Please contact: David Kapp, Administrative Assistant for Public Services.

WASHINGTON UNIVERSITY
AUGUST 1973

CIRCULATION TRANSACTIONS AS A DATA BASE FOR LIBRARY USE STUDIES

One of the frustrating facts about libraries is their failure to 'learn from experience'. Librarians know where many problem areas are, but let them fester simply because of the impossibility of measuring and of defining them for corrective action. One area that lends itself to quantification is that of circulation, and this is particularly true when the circulation system has been automated.

Circulation transactions represent a store of data that reflects the use patterns of a library's clientele. This potential feedback mechanism, although often ignored, can provide the library management with a sound basis to make acquisition decisions, formulate loan policies, schedule work loads, and determine adequate staffing patterns, and even determine hours of operation.

One of the spin-offs from a computerized circulation is the accurate information gathered about borrowers, the materials they use and the relationships between borrowers and materials. In the process of the recording of a loan transaction the following data is stored at least temporarily: the books call number, author, and title, the borrower's number and status, and the period of loan. These records constitute a comprehensive picture of the circulating collection. This data is eventually stored on a 'history tape' in most automated systems. If this data base is properly used a feedback system can be established that uses output (books) as input into the selection and acquisition process. More specifically, accurate data about the specific demands being made upon the collection is gained by analyzing circulation statistics.

Circulation records can be used to study library operations and procedures in three general areas: 1) frequency and usage studies, 2) borrower studies, and 3) administrative data studies.

Frequency and usage totals from the Circulation History File can be accumulated to provide data which is useful to:

1. Identify items unavailable due to heavy use, and therefore candidates for duplicate purchases.
2. Identify items that will probably need replacement due to normal wear and tear from heavy use.
3. Serve as Guidelines in the weeding of the collection.
4. Suggest more efficient arrangements of stack areas.
5. Discover areas of non-use.

Circulation transactions document borrower patterns and indicate:

1. The extent to which the collection is used by faculty, graduate and undergraduate students and which parts are being used by borrowers. Strong and weak areas in the collection can be deduced from their usage patterns. Interlibrary Loan statistics and departmental library circulation figures will contribute to an understanding of borrower needs.
2. The biggest single users of a particular segment of the collection. These persons could be consulted on new acquisitions, or considered

resource 'experts' on that particular subject area.

3. Non-borrowers within the university community.

Administrative data can be obtained from:

1. 'Traffic reports' of peak periods. Staffing and library operating schedules can be determined for such data.
2. Overdue statistics. These can be examined to determine rational loan policies and thus minimize the number of overdues in the system.
3. Interphaseing with other campus files. Assuming more sophisticated interphases with admissions and registrar's files, such information as book use in relation to curriculum, grades, type of student (part-time/full-time), etc., can be derived.

Effective use of library materials is of course not reflected in the circulation transactions data base. The collection of this kind of information requires borrower participation and manual recording of their responses, which could then be compared with circulation usage statistics for further insights. It is conceivable that a future use of the circulation files is to use it to produce user profiles from a compilation of their past circulation history which could be compared to a bibliographic data base such as MARC to produce notices of new materials at regular intervals to individual users.

File structure should be composed of three parts: 1) Current Circulation File, 2) Circulation History File, 3) Circulation Abstract File. The Current Circulation File consists of incomplete loan transactions generated by a charge transaction. Discharge transactions purges the loan record. The Circulation History File is activated at the point of discharge and is updated either immediately or kept on a hold file until an update is economical, i.e., weekly. The Circulation Abstract File would condense the history file to a workable sequence and perform routine calculations automatically. This file would facilitate processing of statistical information concerning transactions.

Usage statistics would normally be programmed as part of the software for the normal production runs, on a regular basis, and as utility programs which would be used to plug in requested paramenters for special use studies. Examples of these two different kinds of statistics are described below.

Normal production statistics

1. Total transactions; loans, renewals, discharges, notices.
2. Traffic reports for selected periods, i.e., hourly, daily, etc.
3. Total use by type of borrower.
4. Total loans in selected areas under special study, e.g., psychology.

Special Use Studies

1. Summaries of individual book use, where each item that matches with a set of parameters, i.e., average spread of use over all copies of a title, number of borrowers who used a single book, heavy use.
2. Accumulation of frequency and usage totals listed for generalized call number areas.
3. Summaries of recorded circulation by borrower groups.
4. Reports of book use over large parts of the collection.

Utilization of the circulation transactions data base requires the development of computer programs which can produce the statistical lists described above. The information supplied by these lists, however, means little without the interpretation and analysis by librarians.

Circulation history tapes have been kept for Olin Library since the beginning of the automated circulation system, however, there is considerable confusion as to what data is actually recorded on the tapes.* There are large gaps in the time periods covered and many of the tapes are mislabled or unlabled.

At the present time, the Library's circulation history files are produced from batching the original transaction cards (minus discharge transactions), (See Figure 2). This procedure presents two problems. First, it has resulted in poor file maintenance as just described, and secondly, the lack of discharge transactions make certain calculations impossible. The only statistics being kept are the merger totals show in Figure 3.

The kind of history file building that has been discussed in this paper (Figure 4), requires the Library Administration to agree to the following at the earliest possible date:

1. Provide the Systems Librarian with input as to the kinds of statistics desired for regular or special runs. These should be specified in detail for Data Processing before September 5.
2. Authorize DPC to include a history file maintenance routine in the current systems planning and programming for the new circulation system.

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*See Figure 1 for a summary of the condition concerning the permanent tape files.

A delay now will mean that a system of collecting transaction data will have to be painfully added at a later time, rather than as part of a logical development of a new system. Furthermore, unless a history file is purposefully planned into the new system, all transactions will be lost because there will be no physical residue of the day's transaction, i.e., transaction cards. Rather, the tapes will be used over and over to record daily transactions, thus destroying any previous data. The circulation master file contains only current active transactions and is automatically cleared of a transaction upon discharge. Unless we determine now to capture this data we have no access to it in the future.

A rough cost estimate provided by DPS was $780.00 a year to build the Circulation Transactions Data Base. There would of course be further programming costs involved in obtaining the management reports discussed in this paper, but DPS already has such programs available, and thus it would not be as costly as a completely new development would be. Management reports would be provided for about $25.00 to $30.00 a report. Considering that we already pay $15.00 to $20.00 for many of the 'lists' we receive, surely we can afford these potentially valuable administrative tools.

Gwen Reveley
Systems Development Librarian
August 22, 1973

WASHINGTON UNIVERSITY
JANUARY 1976

WASHINGTON UNIVERSITY LIBRARIES

USE OF COMPUTER ARCHIVES FOR COLLECTION DEVELOPMENT

Data Services in Olin Library prepares the following archival reports based upon the Circulation Department's computer print-outs:

1 - High Activity Titles
2 - Titles in Demand
3 - Borrower Statistics by Category
4 - Activity Rankings by Category

Additional archives can be generated from this data base as the needs arise.

At the present time these reports are issued semi-annually near the end of the fall and spring semesters; in the future they will be issued at least triannually, viz., fall, spring, and summer.

These computer archives present, among other possibilities, opportunities for study in the area of collection development. Each archive will be described briefly and guidelines will be offered for procedures to be followed in implementing decisions derived from them.

ARCHIVE 1 - HIGH ACTIVITY TITLES

Description: Lists by call number the books circulating 5 or more times during the time period covered. Authors and brief titles are provided, along with an enumeration of the number of loans to various borrower status codes:

1 - Faculty
2 - Staff
3 - Graduate students
4 - Undergraduates
5 - Medical School students & University College students
6 - Outside faculty
7 - Courtesy cards, alumni, etc.
8 - Internal library loans

Uses:
1) Determine candidates for duplicate purchasing
2) Check heavily-used titles for needed repairs
3) Consider items reported on Archive 1 for more than 1 year for Reserve
4) Correlate with Archives 3 & 4 for use patterns

Procedures: Two (2) copies of Archive 1 will be supplied to the Principal Bibliographer, who will examine the entire list and distribute certain sections to appropriate bibliographers as necessary.

The following factors should be considered in deciding upon ordering added copies:

1) Nature of material
2) Availability of substitute material in Olin, on campus, or in the St. Louis area
3) Prospect of continued need for multiple copies
4) Type of borrower
5) Reserve Division' reading list and circulation records
6) Condition of volumes
7) Availability for immediate purchase

The Circulation Department's procedures for ordering added copies (q.v.) will continue in effect, supplemented by the bibliographers' selections.

ARCHIVE 2 - TITLES IN DEMAND

Description: Lists by call number all titles for which 3 or more recalls were submitted during the period covered. Author and brief title included, along with number of recalls placed (not the number of persons initiating the requests).

Uses:
1) Determine candidates for added copies
2) Check heavily-used titles for needed repairs
3) Consider items reported on Archive 2 for more than 1 year for Reserve
4) Correlate with Archive 1 for circulation patterns; titles on both Archives should normally have duplicate copy ordered
5) Correlate with Archives 3 & 4 for use patterns

Procedures: Two (2) copies of Archive 2 will be supplied to the Principal Bibliographer, who will examine the entire list and distribute certain sections to the appropriate bibliographers as necessary.

However, since Archive 2 is compiled after the Circulation Department has routinely ordered 1 or more added copies for each title still in-print (see their procedure for recalled books), bibliographers should correlate this list with Archive 1, shelflist, reserve lists, acquisition records, etc., before ordering additional copies.

ARCHIVE 3 - BORROWER STATISTICS BY CATEGORY

Description: Reports circulation activity within certain broad call number categories by type of borrower. Percentage of total circulation for each category and borrower type is given.

Uses:
1) Analyze use patterns for collection development decisions:
    a) Isolate subject areas that need emphasis
    b) Indicate whether orientation should be toward research or undergraduate instruction
2) Derive trends in collection usage from long-range studies or cumulative effects

Procedures: One (1) copy distributed to each bibliographer. The Principal Bibliographer will coordinate study of these data and make recommendations to the Administrative Office for implementing the results in the area of collection development.

ARCHIVE 4 - ACTIVITY RANKINGS BY CATEGORY

Description: Ranks activity for certain call number categories from most active to least active in terms of total circulation as compared to total number of titles in that category.

Uses:
1) Establish guidelines for collection development based upon use and non-use of materials
2) Aid to decisions concerning transfer, storage, or withdrawal of holdings
3) Determine priorities for stack maintenance and arrangement

Procedures: One (1) copy distributed to each bibliographer. The Principal Bibliographer, in consultation with other librarians, will utilize Archive 4 to reach decisions in the areas listed under "Uses" above.

Jan. 1976

CIRCULATION DEPARTMENT

RECALLED BOOKS: ORDERING ADDED COPIES

When a recalled book is long overdue:

Give the returned recall sheet to the appropriate Borrower/Notice Assistant to bill the patron and order an added copy.

When a second recall is received:

Give the recall information to the Search/Collection Maintenance Assistant to consider ordering an added copy.
Keep the hold card in the file.

When a third recall is received:

Give the recall information to the Search/Collection Maintenance Assistant for 'Rush' action.

In deciding to order additional copies regular collection policies are followed. Consideration is given to other editions in the collection, copies in Departmental Libraries, value to the collection, the number of times the material has already been replaced, the availability in print and the possibility of obtaining it in time to be of use to the patron; bibliographers are consulted when advisable; Interlibrary Loan may be suggested.

7-1-74

Annual
ARCHIVES 7

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OLIN LIBRARY

BORROWER USAGE ANALYSIS

BORROWER CATEGORY	TOTAL IN UNIV	BORROWERS IN CATEGORY		BORROWERS W/ BOOKS		TOTAL BOOKS	TOTAL CHARGES	AVERAGE LOAN PERIOD (DAYS)
		NMBR	PCNT	NMBR	PCNT			
FAC	1,159	1,185	102.2	969	83.6	22,140	25,401	63
STAFF	3,704	766	20.6	490	13.2	4,039	4,464	23
GRAD	3,267	3,532	108.1	2,316	70.8	33,768	45,051	35
UNGR	4,229	4,806	113.6	3,689	87.2	36,820	51,309	18
MED & UC	3,651	1,530	41.9	1,061	29.0	6,056	6,862	19
HECC	2,633	361	13.7	284	10.7	3,368	3,679	25
MISC		362		244		3,037	3,392	26
CARREL	296			244	82.4	8,006	10,943	75
TOTALS	18,939	12,542		9,297		117,234	151,101	35

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THE UNIVERSITY OF MICHIGAN

UNIVERSITY LIBRARY

Graduate Library
Circulation Services, Room 104 HHGL North

ANN ARBOR, MICHIGAN 48104

STATEMENT OF LIBRARY CIRCULATION SYSTEM RECORDS KEPT

0. General

a. The Library does not maintain any data base of information about its users, but only information deemed relevent to the loaning of books

b. The Library does not maintain historical records of who has borrowed what items and when

c. The Library maintains records of current loans of books which include only the identification number of the borrower and his borrower status (i.e., faculty, student, staff, guest)

d. Records of loans are destroyed when books are returned to the Library and no fine or fee is owed in connection with the loan

e. The Library does not reveal the identify of an individual borrower to another person or agency without his/her permission

f. The Library does not allow access by other agencies or persons to its current data

g. Records of loans are created by the request of users to borrow books or by Library staff in correcting or updating these loan records. Records created by Library staff are so marked

1. Registration of Borrowers

a. Registration records consist of an identification number used in all records of transactions plus address and affiliation information for purposes of 1) identification of borrowers from borrower ID numbers and 2) location of borrowers to all the Library to secure the return of loaned materials

b. Registration records are maintained in manual form only

2. Circulation Records

a. Circulation records contain only the borrower's nine digit identification number as assigned by the University, the University Registrar, or the Library in accordance with University policy*. Although this number is visable to all users of the public listing of circulation records, the identity of the borrower will not be revealed by the Library.

b. Circulation records are for currently loaned books only

3. Sanctioned Borrowers

a. Definition: "Sanctioned borrower" is one against whom the Library has imposed a fine, fee or penalty for abuse of Library circulation rules and regulations, such as returning books late or not at all

b. The Library maintains only manual records of sanctioned student borrowers. These records may include information on past transactions which are no longer outstanding. Such information includes amounts of Library fines owed, paid and outstanding. Records are not kept for students who have no currently outstanding fines.

c. The Library maintains a list of non-students who have been sanctioned on a computerized file. This file consists of borrower's dientification number, name and name of the reporting library unit and reason for the sanction. Access to this file by Library staff is strictly limited. The file is printed and distributed to non-automated library units. The file contains current information only; no historical records are kept. Manual files are maintained which match the computer file. The manual files also contain a record of books returned and payments of fees made.

4. Minimum Requirements for Use of Circulation System

a. Borrowers not employed by the University or attending the University as students must register with the Library before borrowing books

b. Borrowers must have a nine digit identification number

c. Borrowers must supply the University or the Library with current address information and report promptly any changes.

d. Persons residing outside of Ann Arbor must have a telephone.

5. Responsible Officers

a. Frederick H. Wagman, Director

b. Willard Davis, Head, Circulation Services, Graduate Library

c. Judith Avery, Circulation Librarian, Undergraduate Library

*Currently, the social security number

6. Access to Records

a. Individuals may request the Library to provide a list of all outstanding records in their name. Advance notice is required

ACCESS TO RECORDS

When the Library changed to an automated circulation system in 1969, no particular restraints were placed on access to the information generated by the system. The Library staff members have been, by far, the greatest users of the information inherent in the system. For a number of years, patrons were accommodated when they asked who might have a particular book charged out. This was very helpful, although occasionally some question was raised as to the propriety of providing such information. However, in 1977, this became a real issue with a patron, and on the advice of the University Legal Counsel, the Library no longer identifies a patron who has borrowed a particular book. The Library retains borrowers listings (Enclosures 10 and 11) indefinitely, outstanding loans list (Enclosure 14) on a partial basis for approximately 18 months and the daily, monthly, quarterly and annual statistical summaries (Enclosures 15 and 19) indefinitely. The current outstanding loans list (Enclosure 14) is available at any time to patrons. Other records are available only to the Library staff.

Enclosure 29

RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

RUTGERS UNIVERSITY LIBRARIES • NEW BRUNSWICK • NEW JERSEY 08903

Draft Policy on the Confidentiality of Library Records

The purpose of this policy is to ensure the confidentiality of records maintained by the Rutgers University Libraries concerning use of the libraries by individuals. This policy also applies to user records maintained on individuals for library administration purposes; such records are obtained from other units within the University or elsewhere. Information contained within employee files is covered under separate policy.

Confidential records subject to this policy include, but are not limited to, paper copy, microtext, and machine-readable information. Illustrative examples of confidential records concerning an individual are a list of books or other print or non-print materials borrowed from the library; the use of reserve materials; financial obligation to the library; directory information (the name and address of an individual) supplied on the basis of confidentiality.

Only the following persons will have routine access to confidential user information: (1) Employees of the library or other units of the University who have need to examine the records, including library circulation personnel and registrar office employees. Such need must be for the purpose of administering library policy. (2) The Person who is the subject of the record.

The following special circumstances require individual attention and decision. (1) When legal papers such as a subpoena are served, the library will consult with appropriate legal authority before responding. Records will not be released until the legal order is in proper form and good cause has been shown. No user records will be made available by the mere display of a government badge or other official identification. (2) When requests for user information for the purposes of legitimate research are received, confidential information may be released to a researcher at the discretion of the library if the following conditions are met:

(a) The research has scholarly merit.
(b) The research results will be open.
(c) Confidential information per se is not the subject of the request.
(d) In gathering the date, the information being gathered is linked with individuals because of the physical proximity of the two data elements.
(e) The separation and identification of the information would be prohibitive in cost or effort.

Richard E. Stern
March 1978

(This was retyped for use on 4/19/78.)